ORDER NO. SD83072593A4

Service Manual

QUARTZ Synthesizer FM/AM Stereo Receiver

SA-510

[PA], [PE], [PC]

SA-510(K)

[PC]

Areas

[PA] is available in Far East PX.
[PE] is available European Military.
[PC] is available European Audio Club.

*The colors of this model include silver and black.
*The black type model is provided with (K) in the Service Manual.

Please use this manual together with the service manual for Model No. SA-510, Order No. SD83052499C1.

CHANGES

■ Specifications

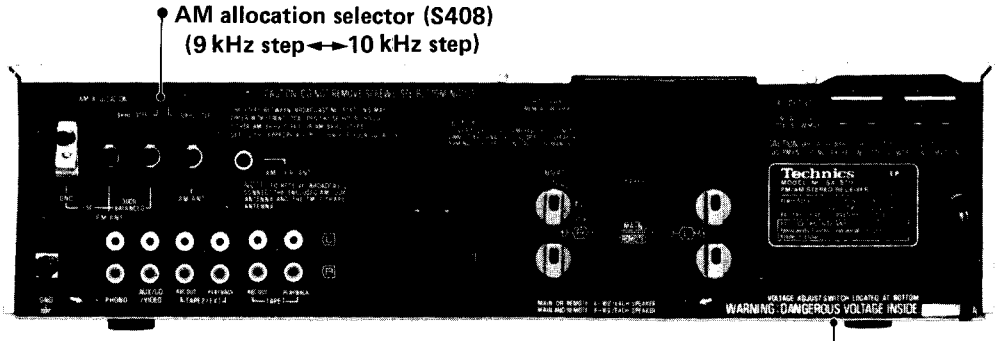
[M]

■ FM TUNER SECTION	
Frequency range	87.9 ~ 107.9 MHz
■ AM TUNER SECTION	
Frequency range	530 ~ 1620 kHz
■ GENERAL	
Power consumption	250W, 320VA
Power supply	AC 120V, 60 Hz
Weight	8.3 kg (18.3 lb)

[PA, PE, PC]

■ FM TUNER SECTION	
Frequency range	87.50 ~ 108.00 MHz (50 k Hz step)
■ AM TUNER SECTION	
Frequency range	522 ~ 1611 kHz (9 k Hz step) 530 ~ 1620 k Hz (10 k Hz step)
■ GENERAL	
Power consumption	380W
Power supply	AC 50 Hz/60 Hz, 110V/120V/220V/240V
Weight	8.6 kg (19.0 lb.)

■ LOCATION OF CONTROLS (Addition Only)


AM allocation selector (S408)
(9 kHz step←→10 kHz step)
Technics
WARNING: DANGEROUS VOLTAGE INSIDE
Voltage selector (on the bottom board) S16 (110←→120←→220←→240V)

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Panasonic Tokyo
Matsushita Electric Industrial Co., Ltd.
1-2, 1-chome, Shibakoen, Minato-ku Tokyo 105 Japan

■ REPLACEMENT PARTS LIST

Notes:

(1) Mentioned in this parts list are only those changed in Model No. SA-510 for destination [M] area.

(2) Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

(3) The "Ⓢ" mark is service standard parts and may differ from production parts.

(4) "Ⓚ" marked parts are used for black type only, while "○" marked parts are for silver type only.

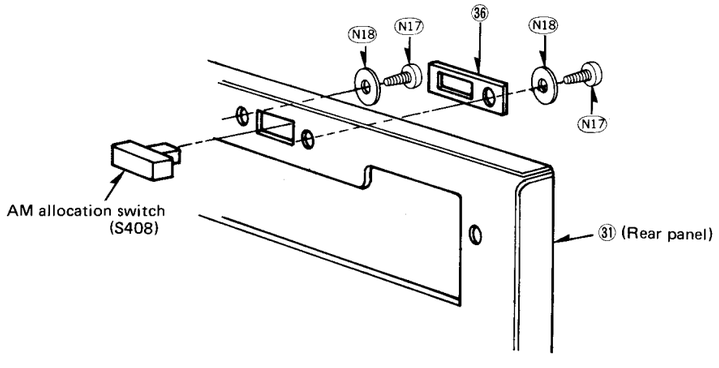
(5) Parts other than "Ⓚ" and "○" marked are used for both black and silver types.

Ref. No.	Change of Part No. SA-510 [M]	Change of Part No. SA-510 [PA],[PE],[PC],[K-PC]	Part Name & Description	Per Set (Pcs.)	Remarks
TRANSISTORS					
Q905	Addition	2SC1685–Q	Transistor	1	Ⓢ
Q906	Addition	2SA722–S	Transistor	1	Ⓢ
DIODES					
D203	LN346GP	○ LN346GP	Diode, Signal Strength (3)	1	
		Ⓚ LN446YP	Diode, Signal Strength (3)	1	
D415	LN0603QP3G	○ LN0603GP3G	Diode, New Class A Indicator	1	
		Ⓚ LN0603YP4	Diode, New Class A Indicator	1	
D914, 916	Addition	MA162A	Diode	2	Ⓢ
COIL					
L203	Addition	SLQZ10G1–D	Choke	1	
FUSES					
F1	XB1F40NU14	XBA2C31TR0	250V, T3.15A	1	⚠
F2	Addition	XBA2C16TR0	250V, T1.6A	1	⚠
TRANSFORMERS					
T1	SLT5N419	SLT5N423	Power Source	1	⚠
SWITCHES					
S16	Addition	ESE37219	Voltage Selector	1	⚠
S408	Addition	SSS43	Allocation	1	
THERMISTOR					
TH201	Addition	ERTD2FHL103S	10kΩ	1	
RESISTORS					
R208	ERD25FJ103	ERD25TJ153	15kΩ	1	Ⓢ
R915, 917	Addition	ERD25TJ104	100kΩ	2	Ⓢ
R916	Addition	ERD25TJ273	27kΩ	1	Ⓢ
R918	Addition	ERD25TJ224	220kΩ	1	Ⓢ
R919	Addition	ERD25TJ824	820kΩ	1	Ⓢ
R1001	ERC12ZGK335	Deletion	Solid, 3.3MΩ	0	
CABINET and CHASSIS PARTS					
1	SGW4650PA	○ SGW4650PA	Front Panel Ass'y (Silver)	1	
		Ⓚ SGW4650BA	Front Panel Ass'y (Black)	1	
2	SGU347SA	○ SGU347SB	Transparent Plate (Silver)	1	
		Ⓚ SGU347BA	Transparent Plate (Black)	1	
3	SGXA510M	○ SGXA510M	Grille (Silver)	1	
		Ⓚ SGXA510KP	Grille (Black)	1	

Ref. No.	Change of Part No. SA-510 [M]	➡ SA-510 [PA],[PE],[PC],[K-PC]	Part Name & Description	Per Set (Pcs.)	Remarks
3–1	SBC483–2	○ SBC483–2	Button (Silver)	1	
		ⓚ SBC483–4	Button (Black)	1	
3–6	SDU193SA	SDU193SB	Dial Plate	1	
6	SDU89–1	○ SDU89–2	Filter (Silver)	1	
		ⓚ SDU89–1	Filter (Black)	1	
8	SBD69–2M	○ SBD69–2M	Button (Silver)	1	
		ⓚ SBD69–1M	Button (Black)	1	
9	SGX7515	○ SGX7515	Case (Silver)	1	
		ⓚ SGX7515–1	Case (Black)	1	
16	SML137	SML137–3	Holder	1	
18	SJT345	SJT347	Terminal, Fuse	2	
26	RJA9Y	RJA52Z	Cord, Power Source	1	⚠ Ⓢ
27	RHR111	SHR127	Bushing	1	
31	SGP3730A	SGP3730–5A	Rear Panel	1	
33	SKC1430S1	○ SKC1430S1	Cabinet (Silver)	1	
		ⓚ SKC1430BB1	Cabinet (Black)	1	
35	SSM175–4	○ SSM175–7	Meter (Silver)	1	
		ⓚ SSM175–4	Meter (Black)	1	
36	Addition	SHR5025–1	Spacer, Allocation Switch	1	
SCREWS					
N15	SNE2095–2	○ SNE2095–2	Cabinet, (Silver)	4	
		ⓚ SNE2095–3	Cabinet, (Black)	4	
N17	Addition	XSN26+6BV	Voltage Selector, ⊕2.6 x 6	2	Ⓢ
N18	Addition	XWA26BFZ	Voltage Selector, ϕ2.6	2	Ⓢ
ACCESSORIES					
A6	SQF11677–2	PA, PE SQF11847	Instruction Book (For PA, PE area)	1	
		PC SQF11847–1	Instruction Book (For PC area)	1	
A7	Addition	SJP9215	Plug Adaptor	1	⚠
PACKING PART					
P1	SPG4389	SPG4497	Carton Box	1	

EXPLODED VIEW

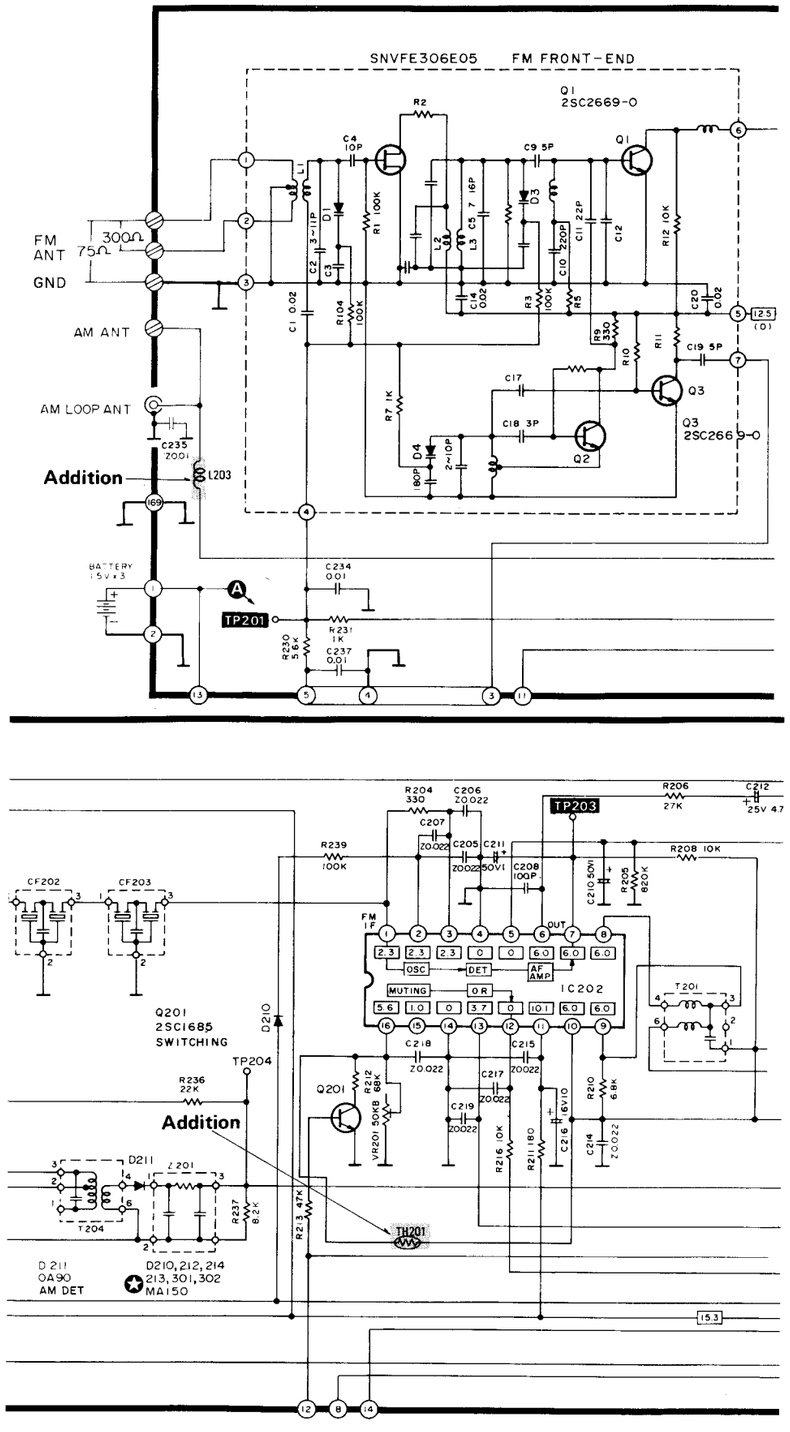
(Addition)



■ CHANGE OF SCHEMATIC DIAGRAM

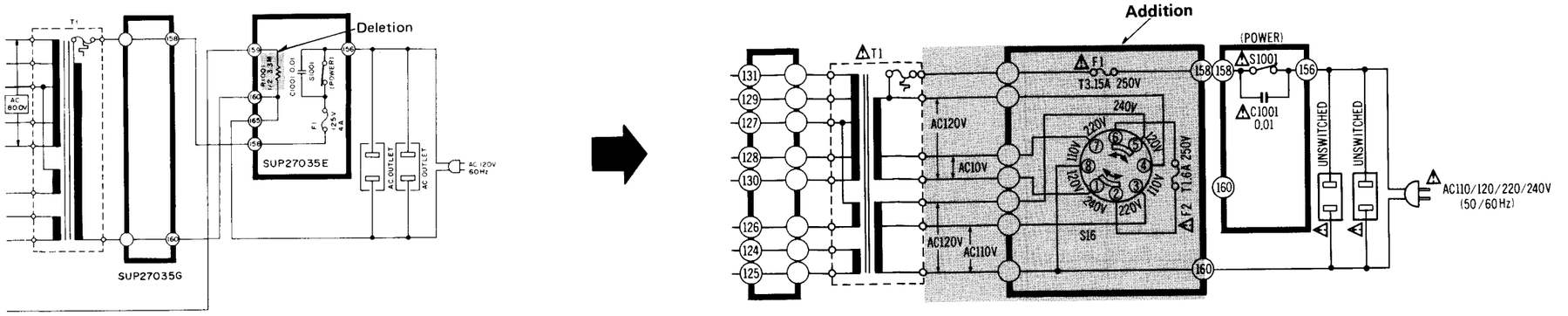
Deletion and addition

■ FM/AM Tuner Circuit

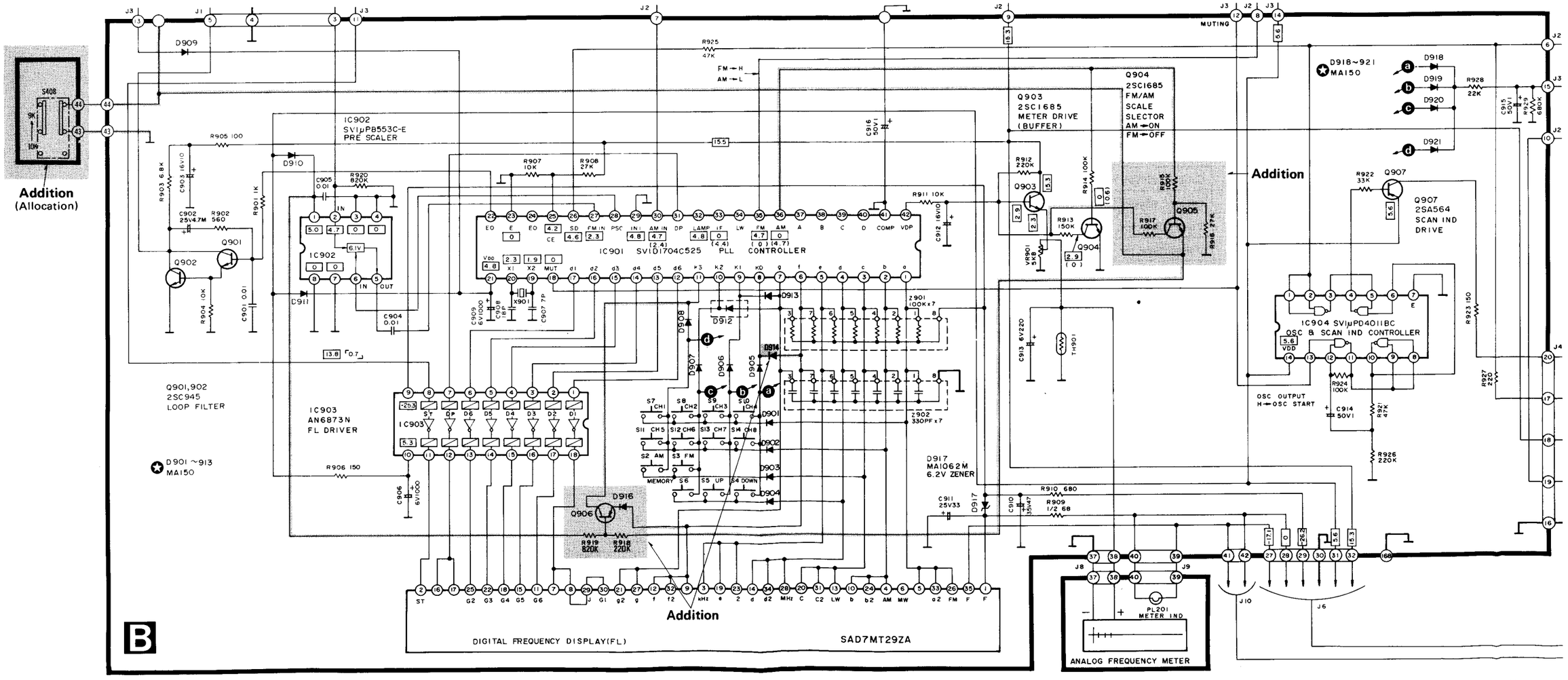


■ Power Source Circuit

- **Power source circuit**



■ FM/AM Preset Tuning Circuit



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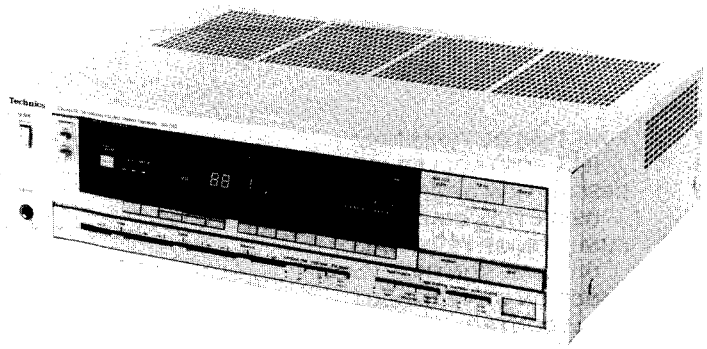
ORDER NO. SD83052499C1

Service Manual

QUARTZ Synthesizer FM/AM Stereo Receiver

SA-510

[M], [MC]



Areas

* [M] is available in U.S.A.
* [MC] is available in Canada.

Specifications (IHF '78)

(Specifications are subject to change without notice for further improvement.)

■ AMPLIFIER SECTION

Rated minimum sine wave RMS power output
20 Hz~20 kHz both channels driven
0.005% total harmonic distortion
60W per channel (8 ohms)

1 kHz continuous power output both channels driven 0.005% total harmonic distortion	65W per channel (8 ohms)
Dynamic headroom	1.8 dB (8 ohms)
Total harmonic distortion	
rated power at 20 Hz~20 kHz	0.005% (8 ohms)
half power at 20 Hz~20 kHz	0.005% (8 ohms)
half power at 1 kHz	0.001% (8 ohms)
SMPTE intermodulation distortion	0.01% (8 ohms)
Frequency response	
PHONO	RIAA standard curve ±0.8 dB
AUX/CD/VIDEO, TAPE 1, 2/EXT	5 Hz~100 kHz, −3 dB
Input sensitivity	
PHONO	0.35 mV (2.5 mV, IHF '66)
AUX/CD/VIDEO, TAPE 1, 2/EXT	19 mV(150 mV, IHF '66)
S/N (IHF, A)	
PHONO	74 dB (81 dB, IHF '66)
AUX/CD/VIDEO, TAPE 1, 2/EXT	76 dB (90 dB, IHF '66)
Maximum input voltage	
PHONO	170 mV (170 mV, 1 kHz)
Input impedance	
PHONO	47 kilohms
AUX/CD/VIDEO, TAPE 1, 2/EXT	15 kilohms
Tone controls	
BASS	50 Hz, +10 dB~ −10 dB
TREBLE	20 kHz, +10 dB~ −10 dB
Subsonic filter	30 Hz, −6 dB/oct.
High filter	7 kHz, −6 dB/oct.
Loudness control (volume at −30 dB)	50 Hz, +9 dB
AF muting	−20 dB
Low frequency damping factor	40 (8 ohms) 20 (4 ohms)
Load impedance	
MAIN or REMOTE	4~16 ohms
MAIN and REMOTE	8~16 ohms

■ FM TUNER SECTION

Frequency range	87.9~107.9 MHz
Sensitivity	10.8 dBf (1.9 μV, IHF '58)
50 dB quieting sensitivity	
MONO	16.1 dBf (3.5 μV IHF '58)
STEREO	38.3 dBf (45 μV IHF '58)
Total harmonic distortion	
100 Hz	0.08% (MONO), 0.2% (STEREO)
1 kHz	0.08% (MONO), 0.15% (STEREO)
6 kHz	0.2% (MONO), 0.3% (STEREO)
S/N	
MONO	78 dB
STEREO	72 dB
Frequency response	20 Hz~15 kHz, +1 dB, −2 dB
Alternate channel selectivity	75 dB
Capture ratio	1 dB
Image rejection at 98 MHz	55 dB
IF rejection at 98 MHz	75 dB
Spurious response rejection at 98 MHz	82 dB
AM suppression	55 dB
Stereo separation	
1 kHz	45 dB
10 kHz	35 dB
Carrier leak	
19 kHz	-40 dB
38 kHz	-55 dB
Antenna terminals	300 ohms (balanced) 75 ohms (unbalanced)

Technics

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Carolina, Puerto Rico 00630

■ AM TUNER SECTION

Frequency range	530~1620 kHz
Sensitivity	20 μV, 300 μV/m
Selectivity	55 dB
Image rejection at 1000 kHz	40 dB
IF rejection at 1000 kHz	40 dB

■ GENERAL

Power consumption	250W, 320 VA
Power supply	AC 120V, 60 Hz
Dimensions (W×H×D)	430 × 120 × 330 mm (16-15/16" × 4-23/32" × 13")
Weight	8.3 kg (18.3 lb.)

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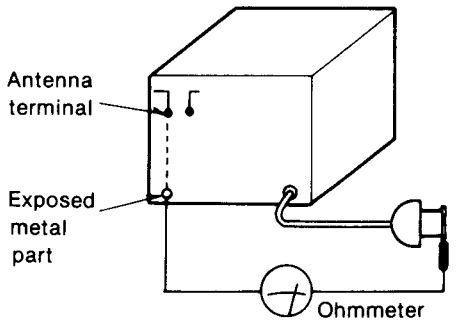
■ SAFETY PRECAUTION

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

• INSULATION RESISTANCE TEST

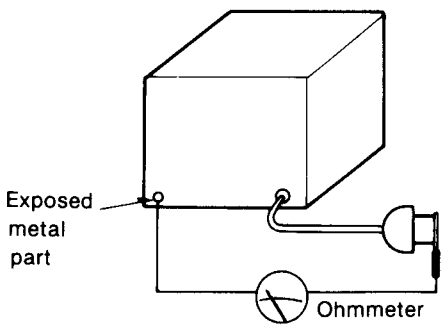
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3MΩ and 5.2MΩ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = 3MΩ—5.2MΩ

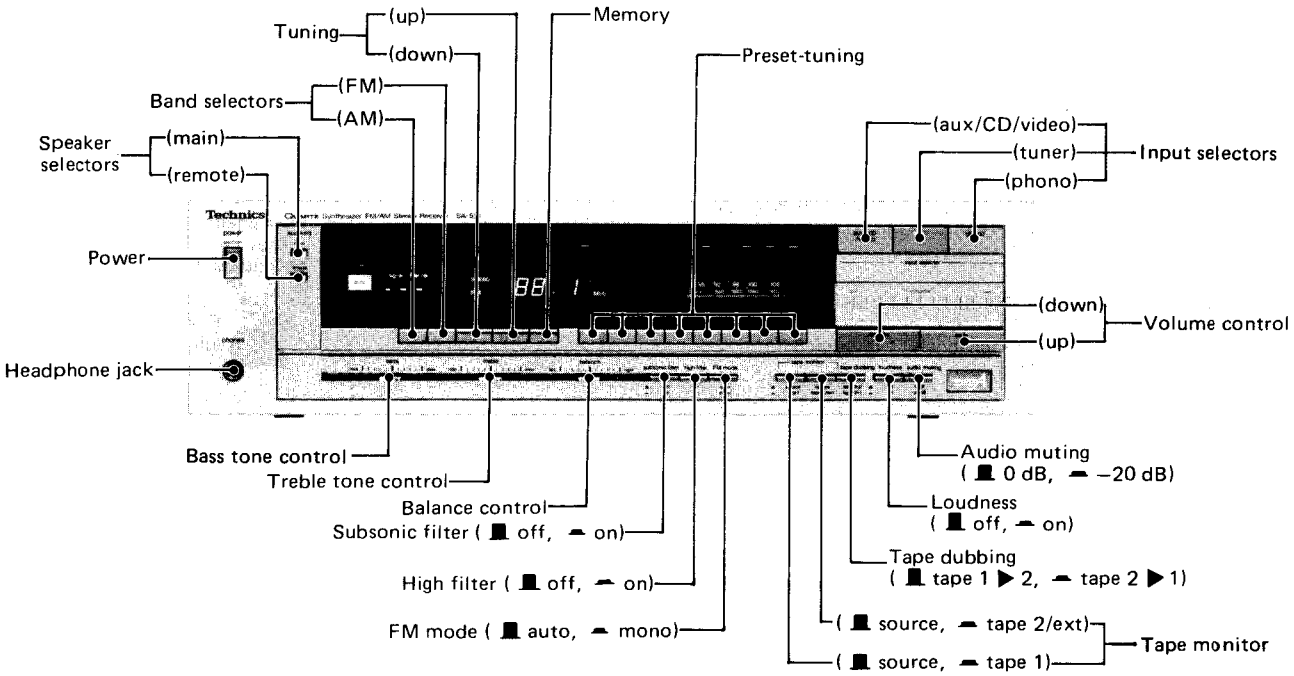


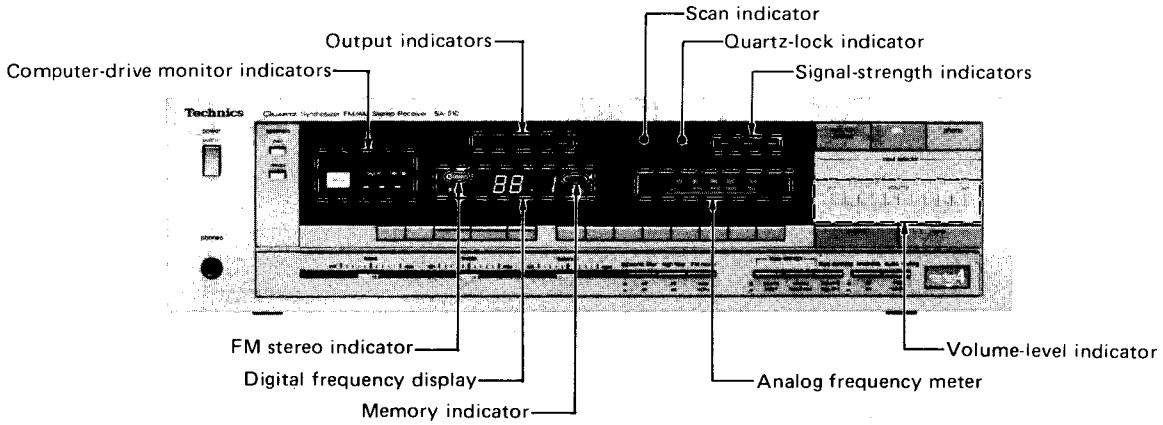
(Fig. B)

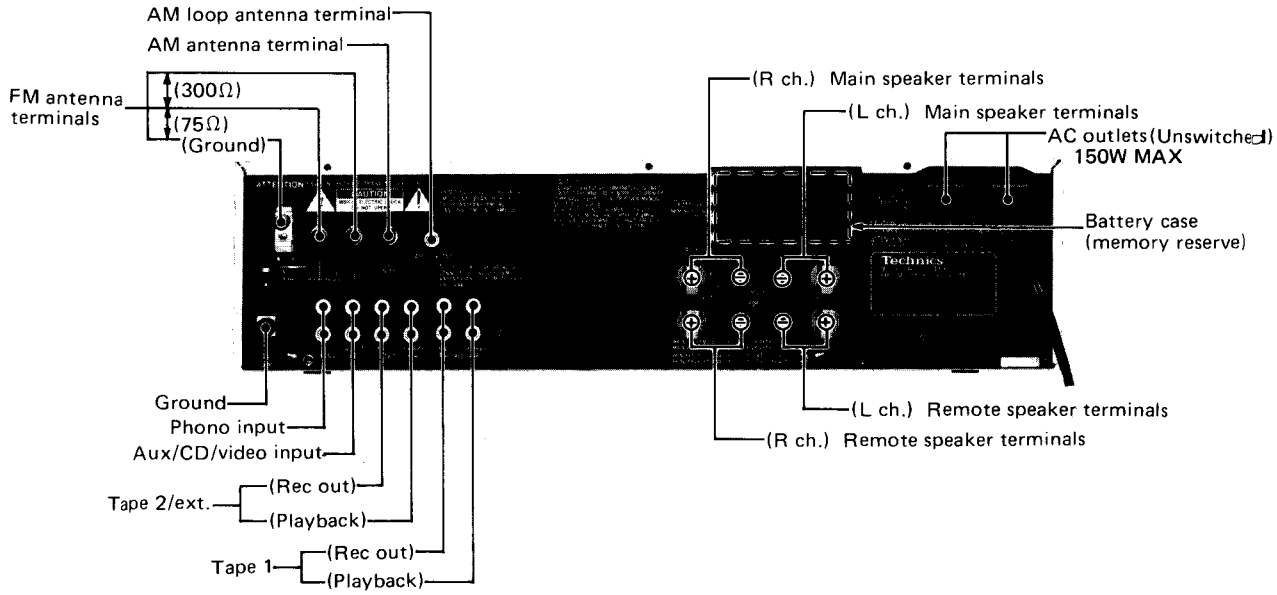
Resistance = Approx ∞

4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

■ LOCATION OF CONTROLS







* Phono input capacitance is about 150pF.

■ HOW TO OPERATE

• Preset radio broadcast frequencies

This unit is used to preset as many as 16 radio broadcast frequencies: FM/AM random presetting. After broadcast frequencies have been preset as described below, any desired station can be quickly and easily selected by simply touching one button.

■ Memory presetting

There are two types of memory presetting: automatic and manual. Select whichever is preferred.

1. Automatic presetting:

Beginning at the frequency indicated by the digital display, the FM broadcasting stations and AM broadcasting stations will be automatically preset to "channels" 1 through 8 for FM and 9 through 16 for AM, respectively.

Note that in mountainous or remote areas, broadcasting stations which have weak broadcasting signals cannot be automatically preset into the memory.

2. Manual presetting:

Stations can be freely preset to any desired channel.

Before memory presetting

Each button is used to preset two stations.

Front channels	Back channels
Presetting front channels (CH 1~8)	Presetting back channels (CH 9~16)
Press momentarily.	Press slightly longer.

• Automatic presetting:

1 Power: "on" (■—■)

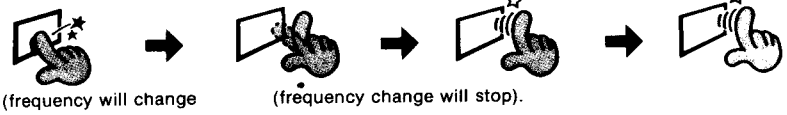
2
- To preset an FM station: press the "FM" button.
- To preset an AM station: press the "AM" button.

3
- To preset FM broadcasting stations: Set to 87.9 MHz.
- To preset AM broadcasting stations: Set to 530 kHz.

① Press the button and hold slightly (frequency will change continuously).

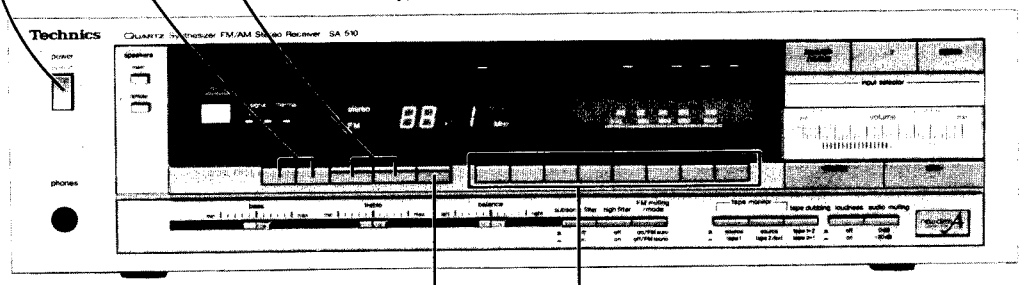
② Release it at 87.9 MHz for FM or 530 kHz for AM, and then press the button again momentarily (frequency change will stop).

③ Press the button momentarily (frequency will change each time the button is pressed), and tune to one of the above frequencies.



(frequency will change continuously).

(frequency change will stop).



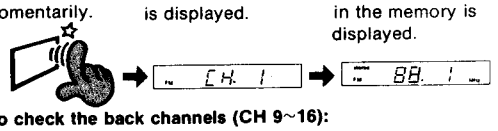
4 Press. When the frequency indication begins to change, release.

(The frequency will change upward, and the automatic presetting will begin with the broadcasting station of the lowest frequency and will continue in order.)

5 Confirm the names (call signs, etc.) of the broadcasting stations which are preset to each channel.

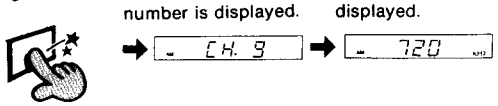
To check the front channels (CH 1~8):

Press momentarily.	Channel number is displayed.	Frequency stored in the memory is displayed.



To check the back channels (CH 9~16):

Press slightly longer.	Release the button when the channel number is displayed.	Frequency stored in the memory is displayed.



Notes:

1. In areas where there are less than 8 FM stations, the remaining channels (through channel 8) will be left empty. The empty channels can be filled by using manual memory presetting.
2. If a new broadcasting station is preset into a channel, the broadcasting station which was previously entered in that channel will be automatically erased.

• Manual memory presetting

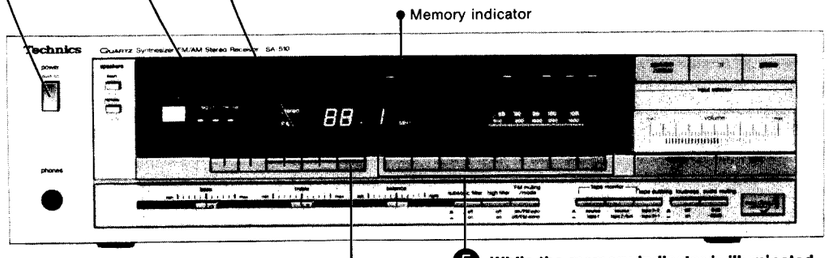
1 Power: "on" (▲—▲)

2 To preset an FM station: press the "FM" button.
To preset an AM station: press the "AM" button.

3 Press the appropriate tuning button to tune to the desired broadcast.

- **Auto tuning**
  Press the button. When the frequency indication begins to change, release the button (a broadcasting station will be selected automatically). Repeat this operation until the desired station is found.

- **Manual tuning**
  Press the button momentarily and tune to the desired station.
  The frequency will change each time the button is pressed.



4 Press momentarily, and then release.

(The memory indicator will illuminate for approximately 4 seconds.)

Note:
If the button is pressed continuously, the frequency will begin to change, and the memory will be preset automatically.
In order to stop the memory presetting, once again press either the "up" button or the "down" button.

5 While the memory indicator is illuminated, press the button of the desired channel.

- **To preset channels 1 through 8:**

Press the button momentarily, and then release.

- **To preset channels 9 through 16:**

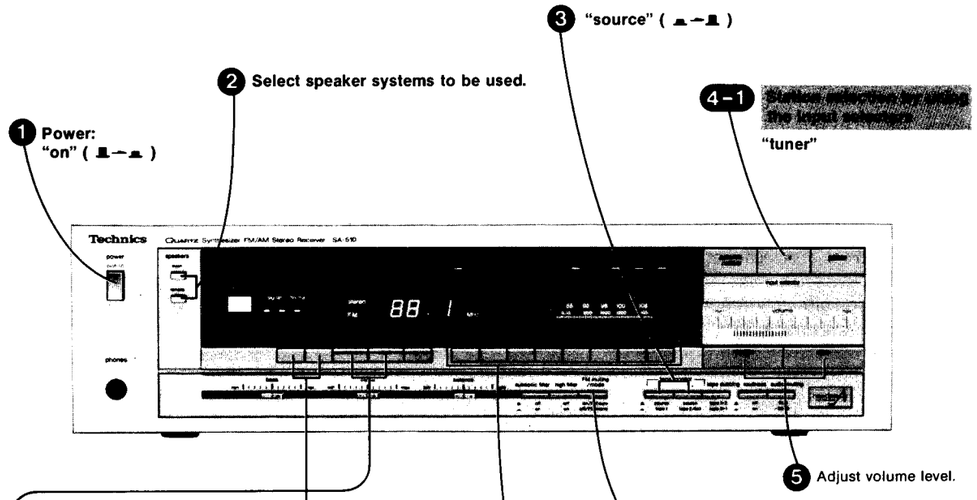
Press the button slightly longer, and then release.

Note:
1. If the memory indication illumination stops before you press the button, once again repeat step (4) and then step (5).
2. If a new broadcasting station is preset into a channel, the broadcasting station which was previously entered in that channel will be automatically erased.

6 Enter the name (call sign, etc.) of the preset broadcasting station on the file sheet (above).

• To listen to radio broadcasts

By pressing one of the preset-tuning buttons or the band selectors, the broadcast can be heard without pressing the input selector marked "tuner".

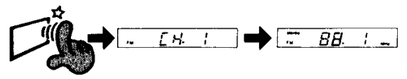

3 "source" (▲—▲)
2 Select speaker systems to be used.
4-1 "tuner"
1 Power: "on" (▲—▲)
Technics
Quartz Synthesizer FM/AM Stereo Receiver SA-510
88. 1
5 Adjust volume level.
If the broadcast signal is weak, or if there is a large amount of interference in a stereo broadcast, set to the "off/FM mono" position.
4-2
1. Press either "FM" or "AM".
2. Press the left button to change the frequency downward, and press the right button to change the frequency upward.
4-3
By pressing one of these buttons, the broadcast can be heard.

- **Auto tuning** Press the button. When the frequency indication begins to change, release the button (a broadcasting station will be selected automatically). Repeat this operation until the desired station is found.

- **Manual tuning** Press the button momentarily and tune to the desired station. The frequency will change each time the button is pressed.

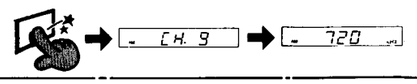
- **To select the front channels (CH1~8):**

Press momentarily.	Channel number is displayed.	Frequency stored in the memory is displayed.



- **To select the back channels (CH 9~16):**

Press slightly longer	Release the button when the channel number is displayed.	Frequency stored in the memory is displayed.

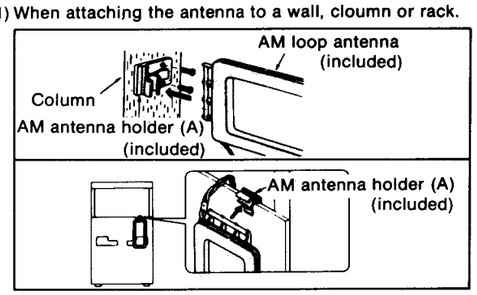


■ HOW TO USE THE AM LOOP ANTENNA

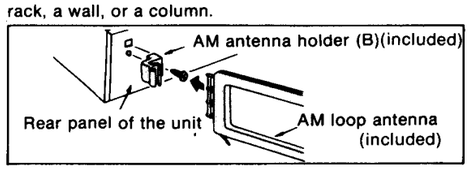
■ Installation of the AM loop antenna

Pay attention to the following points when attaching the antenna.
1) Do not attach it horizontally (to do so would impair reception).
2) Do not attach it close to metal surfaces (to do so would result in noise).
3) Do not attach it close to power cords, speaker wires, etc. (to do so would result in noise).
4) Do not attach it close to a tape deck (when the tape deck is being used, chirping or beeping sounds may be received).

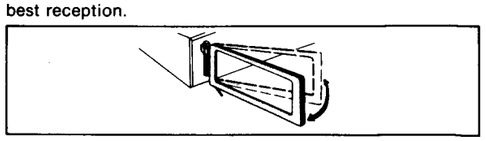
1. Connect the AM loop antenna to the AM antenna terminals located on the rear panel of the unit.
2. Find the height and direction of the antenna where reception is best and then fix it vertically to the wall, rack, etc.
   1) When attaching the antenna to a wall, cloumn or rack.



   2) When attaching the antenna to the unit.
   This type of installation may cause impaired reception or result in signal noise. If possible, attach the antenna to the rack, a wall, or a column.



3. Move the antenna toward the right or left to find the point of best reception.



■ PROTECTION CIRCUITRY

The protection circuitry may have operated if either of the following conditions is noticed:

- No sound is heard when the power is turned on.
- Sound stops during a performance.

The function of this circuitry is to prevent circuitry damage if, for example, the positive and negative speaker connection wires are "shorted", or if speaker systems with an impedance less than the indicated rated impedance of this unit are used.

If this occurs, follow the procedure outlines below:

1. Turn off the power.
2. Determine the cause of the problem and correct it.
3. Turn on the power once again after one minute.

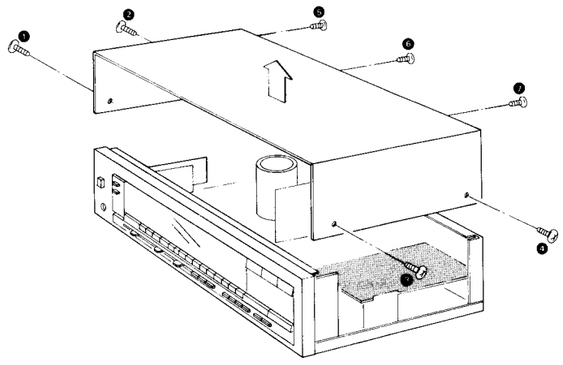
Note

When the protection circuitry functions, the unit will not operate unless the power is first turned off and then on again.

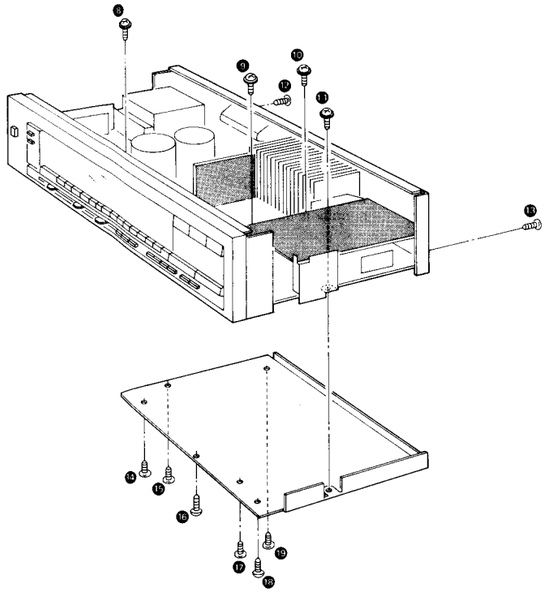
■ DISASSEMBLY INSTRUCTIONS

- **How to remove the cabinet**

1. Remove the 4 setscrews (Fig. 1 : ❶ ~ ❹) on the right and left sides of the cabinet, and the 3 setscrews (Fig. 1 : ❺ ~ ❼) on the back.
2. Remove the cabinet by lifting it in the direction of the arrow.



[Fig. 1]



[Fig. 2]

■ BEFORE REPAIR AND ADJUSTMENT

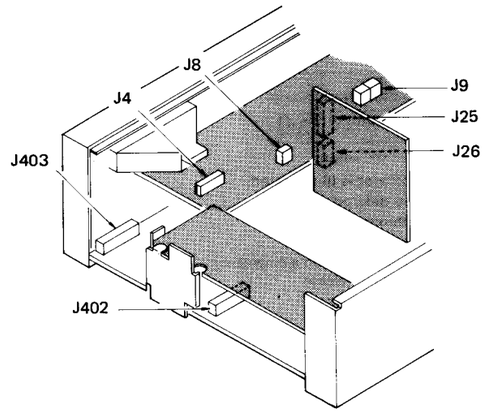
1. Turn off the power supply and short-circuit both ends of the power supply capacitors (C808, C809 56V 8200μF) with a resistor (about 10Ω, 5W) to discharge the charged voltage.
   Do not short both ends of C808 and C809 with a screwdriver. It may damage the component.
2. Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current at 120V, 60Hz in no-signal mode is 150 ~ 500 mA.

- **How to remove the bottom board**

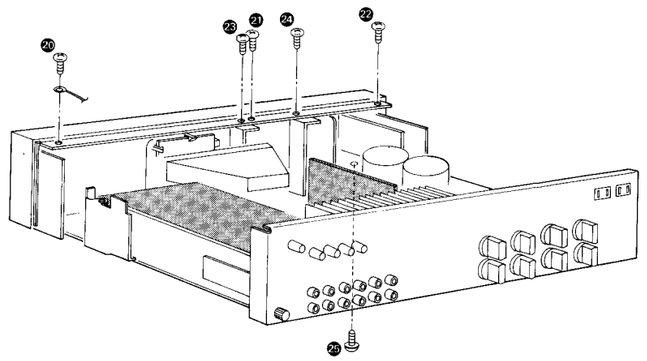
1. Remove the cabinet. (Refer to "**How to remove the cabinet**".)
2. Remove the 3 setscrews (Fig. 2 : ❽ ~ ❿) of the main P.C.B.
3. Remove the setscrew (Fig. 2 : ⓫) of the tuner P.C.B. fixture.
4. Remove the 2 setscrews (Fig. 2 : ⓬, ⓭) of the bottom board, arrow-marked (➡) on the rear panel.
5. Remove the 6 setscrews (Fig. 2 : ⓮ ~ ⓳) of the bottom board.

- **How to remove the front panel**

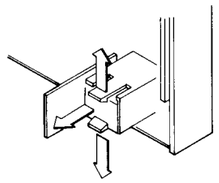
1. Remove the cabinet and bottom board. (Refer to "**How to remove the cabinet and bottom board**".)
2. Remove the 3 setscrews (Fig. 3 : ⓴ ~ ㉒) of the front panel top and the 2 setscrews (Fig. 3 : ㉓, ㉔) of the FL clamp.
3. Remove the setscrew (Fig. 3 : ㉕) of the front panel bottom.
4. Remove the 6 connectors (Fig. 4 : J8, J9, J25, J26, J402, J403.)
5. Release the claws as shown from inside the front panel to remove headphone jack. (Fig. 5) and then remove the front panel.



[Fig. 4]



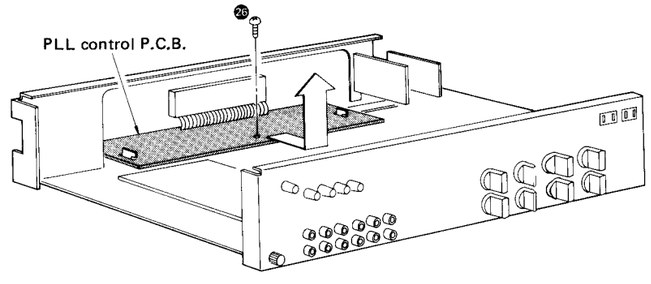
[Fig. 3]



[Fig. 5]

- **How to remove the PLL control P.C.B.**

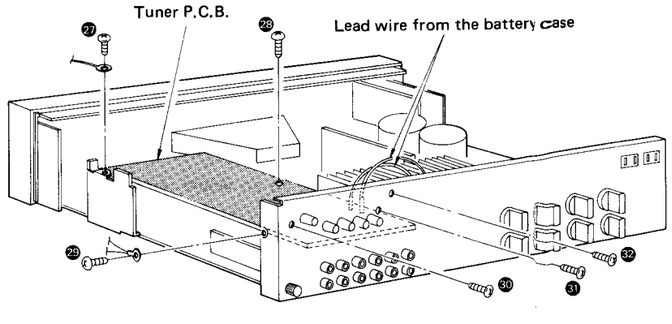
1. Remove the cabinet and front panel. (Refer to "**How to remove the cabinet and front panel**".)
2. Remove the setscrew (Fig. 6 : ㉖) of PLL control of P.C.B.
3. Remove the PLL control P.C.B. from the chassis in the direction of the arrow as shown.



[Fig. 6]

- **How to remove the tuner P.C.B.**

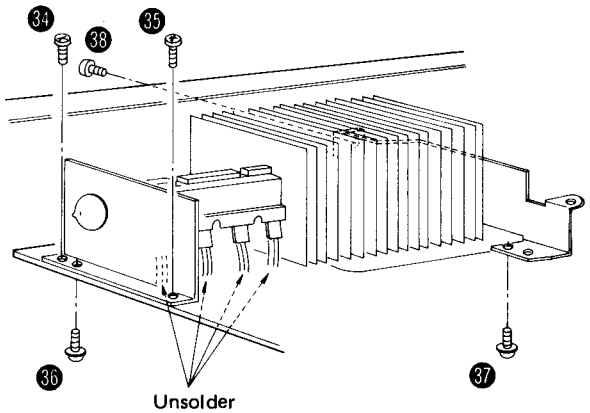
1. Remove the cabinet. (Refer to "**How to remove the cabinet**".)
2. Remove the 2 setscrews (Fig. 7 : ㉗, ㉘) of P.C.B. and the earth lug setscrew (Fig. 7 : ㉙).
3. Remove the 3 setscrews (Fig. 7 : ㉚ ~ ㉜) of antenna terminal plate from the rear panel.
4. Draw the 2 lead wire from the battery case out of the space between the heat-sink and rear panel, and remove the tuner P.C.B. (Fig. 7)



[Fig. 7]

• How to remove the heat-sink

1. Remove the cabinet and bottom board. (Refer to "**How to remove the cabinet and bottom board**".)
2. Remove the tuner P.C.B. (Refer to "**How to remove the tuer P.C.B.**".)
3. Remove the 2 setscrews (Fig. 8 : ㉞, ㉟) at the top and 2 setscrews (Fig. 8 : ㊱, ㊲) at the bottom of heat-sink fixture, and the setscrews (Fig. 8 : ㊳) of rear panel, respectively from top, bottom and rear.
4. Unsolder the power transistors (**Q613 ~ Q616**) from under the P.C.B. and then remove the heat-sink.
5. When installing the power transistor, apply heat diffusing agent (silicon powder, etc.) to both sides of the mica plate, and secure it on the heat-sink with setscrews. Next, secure the heat-sink on the chassis and then solder the power transistor.



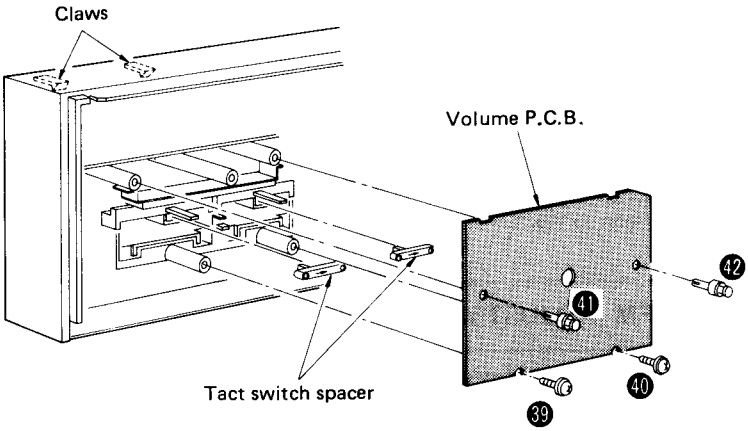
[**Fig. 8**]

• How to remove the volume P.C.B.

1. Remove the front panel. (Refer to "**How to remove the front panel**".)
2. Remove the 2 setscrews (Fig. 9 : ㊴, ㊵) and the 2 latches (Fig. 9 : ㊶, ㊷) of volume P.C.B.
3. Release the 2 claws to remove the volume P.C.B. (Fig. 9)

Note

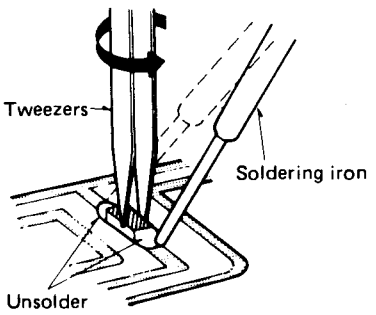
When mounting the volume P.C.B. make sure that the tact switch spacer is in the switch button. Be sure to set it so that the arrow mark (➡) on the tact switch spacer is positioned as illustrated.



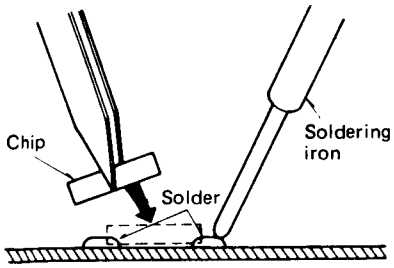
[**Fig. 9**]

■ HOW TO REPLACE CHIPS (RESISTORS)

1. Unsolder from chip by using solder sucker.
2. Remove chip with tweezers by rotating it while removing solder as shown in Fig. 10.
3. Solder circuit board first and then solder chip in the direction of the arrow as shown in Fig.11.



[**Fig. 10**]



[**Fig. 11**]

• Note for replacing chips

1. Do not heat chips more than three (3) seconds.
2. Be careful not to damage the electrode of chips.
3. Use soldering iron (less than 60W) and tweezers for replacing chips.

■ MEASUREMENTS AND ADJUSTMENTS

Note: AM IFT (T204) and AM OSC coil (L201) have been already adjusted, and require no adjustment.

AM ADJUSTMENT

*** Setting and Equipment used**

1. AC electronic voltmeter (VTVM).
2. AM signal generator (AM-SG).
3. Set Band selector to "AM" position.
4. Maintain line voltage at 120 volts.
5. Set speaker selector to "main : on" position.
6. Output of signal generator should be no higher than necessary to obtain an output reading.
7. Use a non-metal screwdriver for the adjustment.

Step No.	AM SIGNAL GENERATOR CONNECTION	AM SIGNAL GENERATOR FREQUENCY	DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	AM-IF ADJUSTMENT					
1	Connect AM-SG to AM antenna terminal through 200 pF capacitor. Common to chassis. (Powerful input) (Refer to Fig. 12)	450 kHz (30% Mod. with 400 Hz)	Frequency of non-inter-ference	Connect AC VTVM or scope to "speaker" terminals.	T203 (AM IFT)	* Adjust the input frequency and adjustment points so that the output becomes maximum.
	AM-RF ADJUSTMENT					
2	Connect AM-SG to AM antenna terminal through 200pF capacitor. Common to chassis. (Weak input) (Refer to Fig. 12)	610 kHz (30% Mod. with 400 Hz)	610 kHz	Connect AC VTVM or scope to "speaker" terminals.	L202 (ANT Coil)	1. Adjust for maximum output. 2. Adjust core of L202 by screwdriver.
3		1500 kHz (30% Mod. with 400 Hz)	1500 kHz	Connect AC VTVM or scope to "speaker" terminals.	CT201 (ANT Trimmer)	1. Adjust for maximum output 2. Repeat steps (2) and (3) until the frequency correctly matches the frequency display.

FM ADJUSTMENT

*** Setting and Equipment used**

1. FM signal generator (FM-SG).
2. Distortion analyser.
3. Oscilloscope.
4. DC electronic voltmeter (VTVM).
5. Frequency counter (19 kHz and 108 MHz measurable).
6. Set band selector to "FM" position.
7. Set FM muting/FM mode selector to off/FM mono" position.
8. Other setting are the same as in AM adjustment.
9. Stereo modulator.

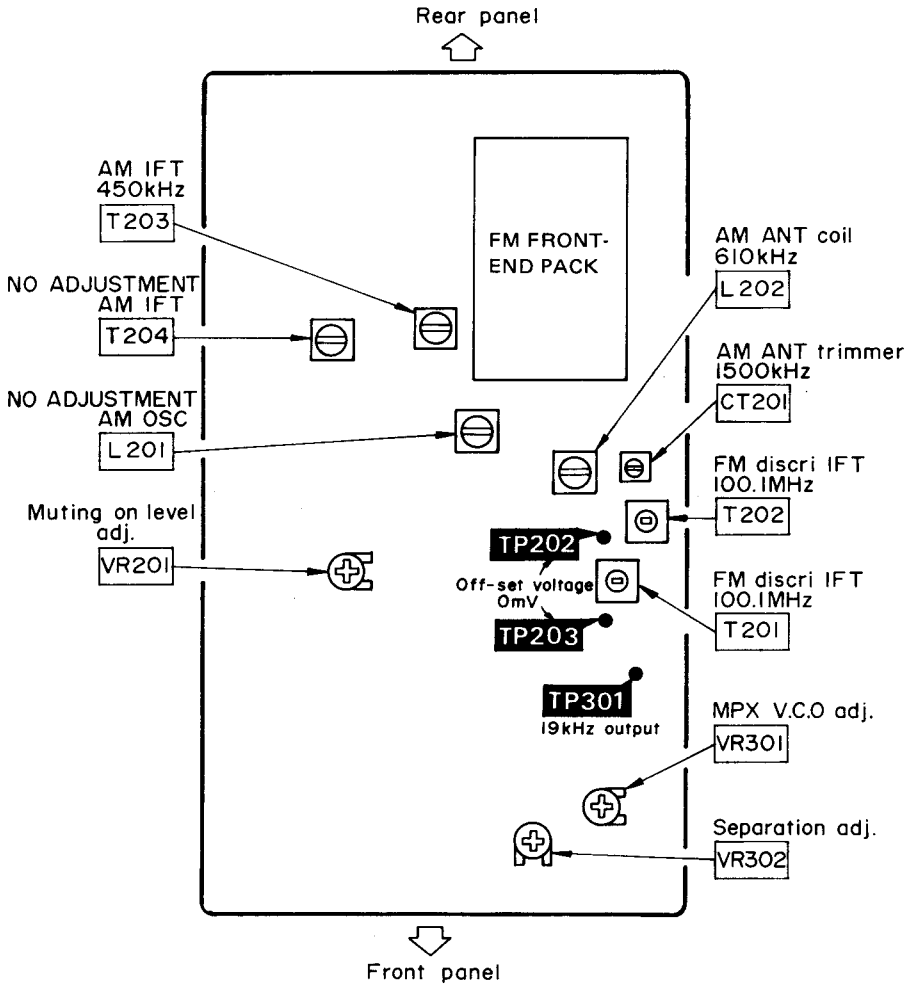
*** Preparation of FM signal generator (FM-SG)**

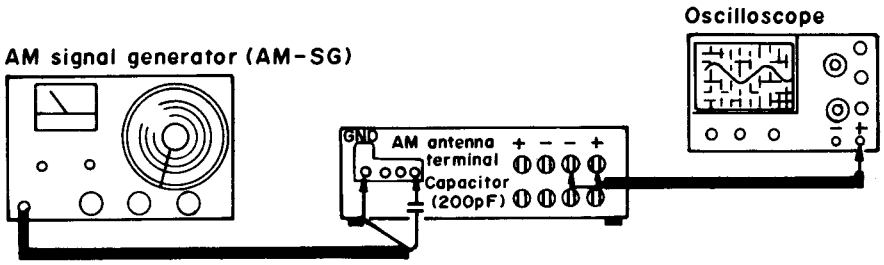
1. Connect stereo modulator to FM-SG.
2. Apply SG output to antenna terminal of the set.
3. The standard input of the set is 60 dB (1 mV), 400 Hz, 100% modulation (Because of attenuation, using coaxial cables. SG output must be 6 dB plus. That is, when input 60 dB, SG output is to be 66 dB.)

Step No.	FM SIGNAL GENERATOR CONNECTION	FM SIGNAL GENERATOR FREQUENCY	DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	FM MONO DISTORTION ADJUSTMENT					
4	Connect FM-SG to FM antenna terminal referring to Fig. 13. (Apply 60 dB to antenna terminal)	100.1 MHz (100% Mod. with 400 Hz)	100.1 MHz	Connect DC VTVM to between TP202 and TP203 through choke coil. (Refer to Fig. 13)	T201 (Discri. IFT)	1. Adjust T201 core so that voltage measured in signal mode is 0 mV (±50mV) in 300mV range. 2. Adjust T202 core so that distortion of right and left channels are minimized.
5		100.1 MHz (100% Mod. with 400 Hz)	100.1 MHz	Connect distortion analyser to "speaker" terminal of the set.	T202 (Discri. IFT)	
	FM MPX V.C.O. ADJUSTMENT					
	USING A FREQUENCY COUNTER			**USING ALTERNATE SYSTEM**		
6	1. 100 MHz, 60 dB Non-modulated mono signal applied to set. 2. Set FM muting/FM mode selector to "on/FM auto" position. 3. Connect frequency counter to TP301 through resistor (100kΩ) referring to Fig. 14. 4. Adjust **VR301** to 19 kHz ± 30 Hz.			1. Apply stereo signal from generator or stereo station to tuner. 2. Adjust **VR301** until stereo indicator lights up. Cement arm of **VR301** as shown in Fig. 15.		
	MUTING ON LEVEL ADJUSTMENT					
7	Connect FM-SG to FM antenna terminal referring to Fig. 16. (Apply 16 dB to antenna terminal.)	100.1 MHz (100% Mod. with 1 kHz)	100.1 MHz	Connect Oscilloscope to "speaker" terminals.	VR201 (Muting on level)	1. Set FM muting/FM mode selector to "on/FM auto" position. 2. Adjust VR201 so that signal output is delivered. (Check to see that delivery of output is discontinued with input level lowered by 1 ~ 2 dB.)

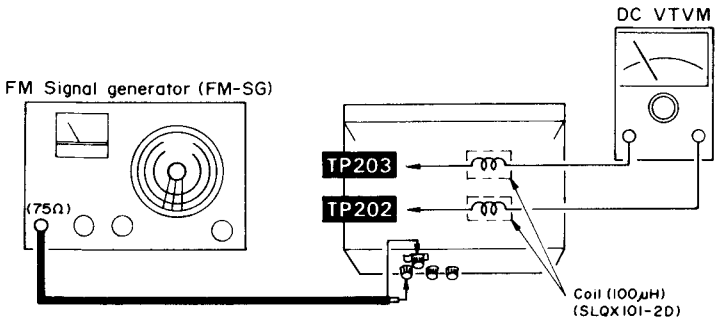
Step No.	FM SIGNAL GENERATOR CONNECTION	FM SIGNAL GENERATOR FREQUENCY	DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	SEPARATION ADJUSTMENT					
8	Connect FM-SG to FM antenna terminal. (Apply 60 dB to antenna terminal.) (Pilot 10% Mod. stereo signal.)	100.1 MHz (100% Mod. with 1 kHz) (L mode)	100.1 MHz	Connect AC VTVM to "Speaker" terminals of the set.	VR302 (Separation)	1. Set FM muting/FM mode selector to "on/FM auto" position. 2. Adjust VR302 so that R output is minimized when stereo modulator is in L (L ch. modulation) mode and that L output is minimized in R mode.
	FM ANALOG FREQUENCY METER ADJUSTMENT					
9	——	No-Signal	107.9 MHz	——	VR901 (Frequency meter)	1. Adjust VR901 so that the analog frequency meter indicates 107.9 MHz. (Refer to Fig. 17) 2. Next operate the tuning button so that 88.1 MHz and 96.1 MHz are indicated in the digital frequency display. Then make sure that the indicator is in contact with each letter. 3. If the requirement in step 2 is not satisfied, go back to step 1 and adjust the indicator within the dotted line of Fig. 17.

- **Adjustment points**

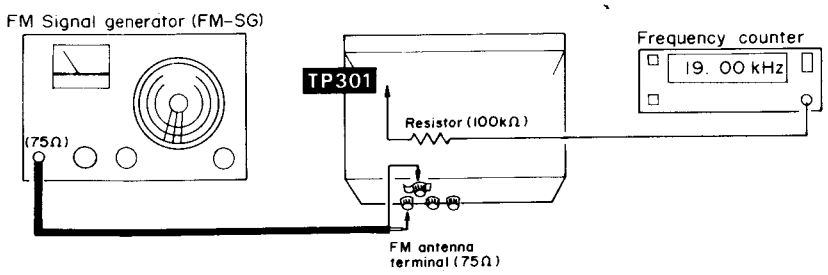




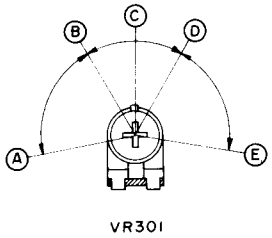
[Fig. 12] (Adjustment of AM)



[Fig. 13] (Adjustment of FM offset)

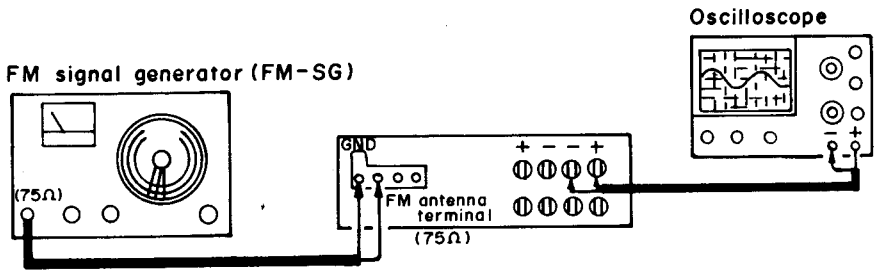


[Fig. 14] (Adjustment of FM MPX VCO)

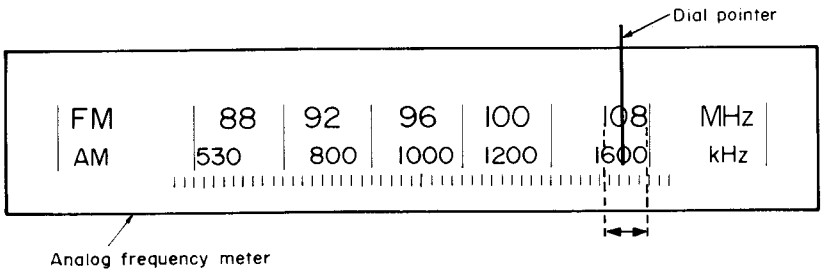


Ⓐ–Ⓑ, Ⓓ–Ⓔ : Stereo OFF position.
Ⓑ–Ⓓ : Stereo ON position. (indicator lighting)
Ⓒ : Adjust point of pilot circuit

[Fig. 15] (Adjustment of FM MPX VCO)



[Fig. 16] (Adjustment of muting on level)



[Fig. 17] (Adjustment of FM analog frequency meter)

AMPLIFIER ADJUSTMENT

1. Adjustment of Load Impedance Detection Circuit (after reparing the speaker impedance detection circuit.) [Refer to Fig. 18]

1. Set the main speaker switch to "on" and the remote speaker switch to "off", then make the volume level minimum.
2. Connect a load with 6.5Ω (1/2W, carbon resistor) or series connected 3.3Ω and 3.3Ω (1/2W, carbon resistor) to the "Main: Lch and R ch" speaker terminal.
3. Connect **TP803** and ground (chassis) with lead wire.
4. Connect a DC voltmeter between **TP801** and ground (chassis) [L channel] or **TP802** and ground (chassis) [R channel].
5. Adjust VR802 (L channel) so that the voltage of **TP801** is 0 mV (−200 mV ~ 50 mV).
6. Adjust VR801 (R channel) so that the voltage of **TP802** is 0 mV (−200 mV ~ 50 mV).
7. Remove the lead wire which connects **TP803** and ground.

Checks

1. Set both main speaker switch and remote speaker selector to "off".
2. Connect a lead with 6.3Ω (1/2W, carbon resistor) or series connected 3.3Ω and 2.7Ω (1/2W, carbon resistor) to the "Remote-L•R channel" speaker terminal.
3. Check that tap selector relay (RLY802) becomes "low tap" when remote speaker switch is set to "on.
   * "Low tap" is a state of tap with tap selector relay (RLY802) turned "on".

2. Checks of Protection Circuit After Repair and Adjustment.

- **Check of Overload Detection and Protection Circuit**

[Overload Detection circuit]

1. Connect 4Ω (resistor or speaker) to main speaker terminal (L channel).
2. Main speaker switch is "on" position.
3. Apply output signal of about 5V at 1 kHz to Aux input terminal.
4. Make sure that no output is delivered when short-circuited with 5W, 0.33Ω resistor.
5. When power switch is turned "on" after turning it "off", then output should be delivered.
6. Similary check the R channel.

- **[DC Detection circuit]**

1. Main sepaker switch is "on" position.
2. Apply ±15V DC to main speaker terminal. Then make sure that RLY801 turns off.
3. Set the main speaker switch to "off", and remote speaker switch to "on".
4. Connect 4Ω (Speaker) to remote speaker terminal (L channel).
5. Apply 5 Hz 300 mV signal to aux input terminal and volume level set at minimum, make sure that output is delivered.

3. Idling (ICQ) Adjustment (after repairing the main amp.)

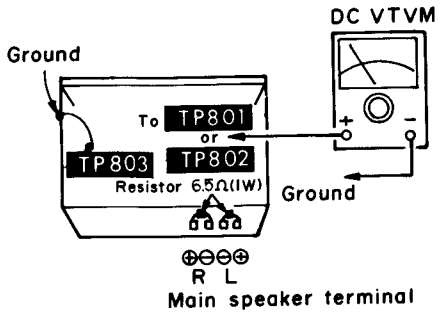
1. After the repair, set the volume level to minimum before turning on the power switch, and connect nothing to the speaker terminal.
2. Completely turn ICQ control (VR601, 602) counter-clockwise.
3. Connect the DC electronic voltmeter to **TP1** (+) and **TP2** (−) [L channel] or **TP3** (+) and **TP4** (−) [R channel]. [Refer to Fig. 19]
4. Make the adjustment as shown below 3 min. after turning power switch "on".

———	TEST POINT	PARTS ADJUSTED	VALUE	———	TEST POINT	PARTS ADJUSTED	VALUE
L channel	**TP1** – **TP2** (Z601)	VR601	25~30 mV	R channel	**TP3** – **TP4** (Z602)	VR602	25~30 mV

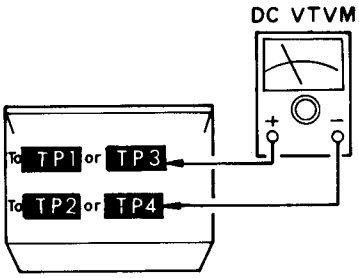
Note 1. Computer drive monitor indicator should indicate "auto".
2. Tap selector relay (RLY802) should be "high tap".
   * "High tap" is a state of tap with tap selector relay (RLY802) turned "off".

4. Clock Adjustment (after replacing the microcomputer)

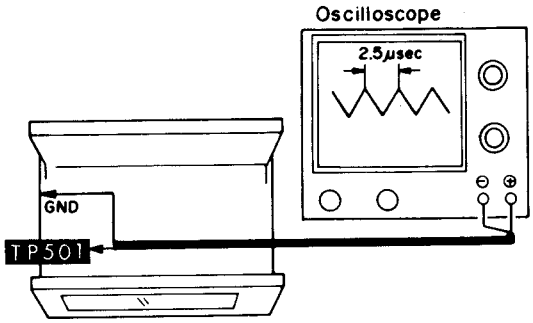
1. Connect the osilloscope to TP501 .
2. Adjust VR501 so that period of waveform is 2.5μsec. (Refer to Fig. 20).



[Fig. 18]

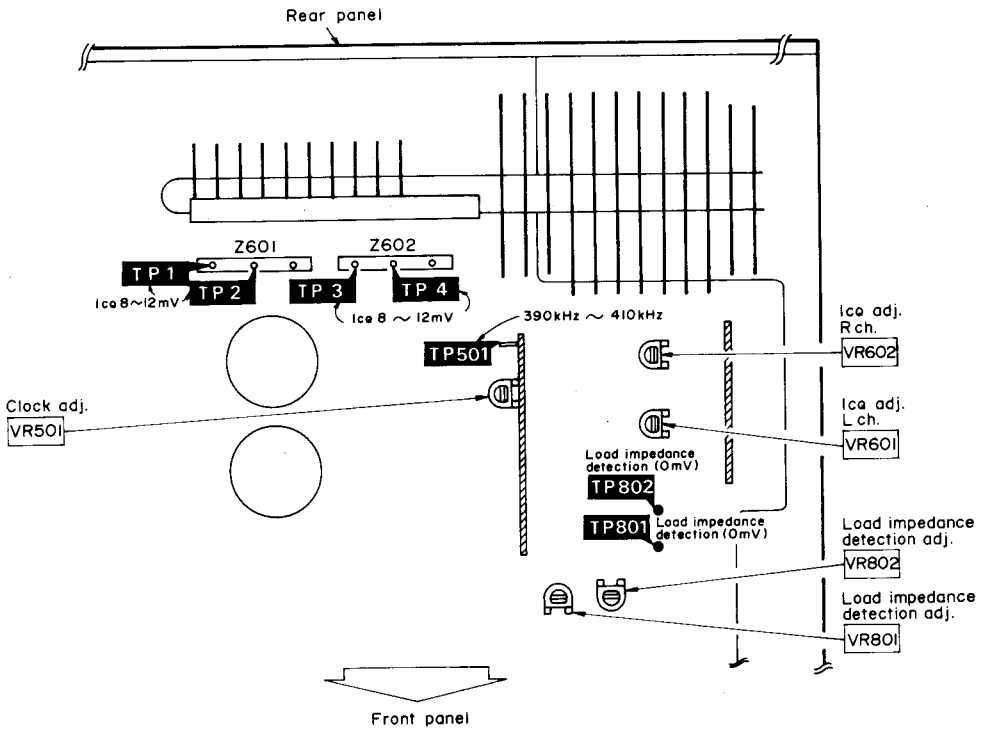


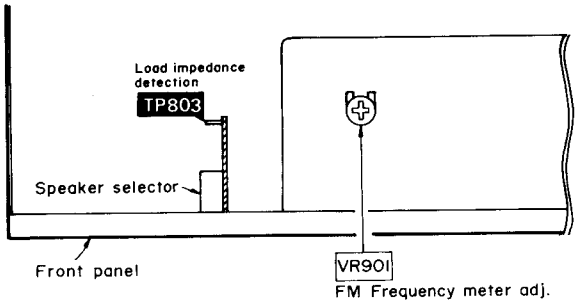
[Fig. 19]



[Fig. 20]

- Adjustment points





■ RESISTORS & CAPACITORS

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. The "Ⓢ" mark is service standard parts and may differ from production parts.
4. The unit of resistance is Ω(ohm), K = 1000Ω, M = 1000kΩ.
5. The unit of capacitance is μF (microfarad). P = 10^{-6} μF
6. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value
ERG	2	AN	J	2R2
Type	Wattage	Shape	Tolerance	Value

Resitor Type	Wattage	Tolerance
ERD : Carbon	10 : 1/8W	J : ± 5%
ERG : Metal Oxide	12 : 1/2W	K : ± 10%
ERC : Solid	25 : 1/4W	
ERO : Metal film	1 : 1W	
	2 : 2W	
	S1 : 1/2W	

ERD10TLJ □□□ → Chip type carbon
ERO10MKG □□□ → Chip type metal film

Numbering System of Capacitor

Example

ECKD	1H	102	Z	F
Type	Voltage	Value	Tolerance	Peculiarity
ECEA	50	M	R47	R
Type	Voltage	Peculiarity	Value	Special use

Capacitor Type	Voltage		Tolerance
	ECEA Type	Order	
ECEA : Electrolytic	OJ : 6.3V	1H : 50V	C : ± 0.25pF
ECCD : Ceramic	1A : 10V	1C : 16V	J : ± 5%
ECKD : Ceramic	1C : 16V	KC : 400V AC	K : ± 10%
ECQM : Polyester	1E : 25V	1 : 100V	Z : +80%, −20%
ECQP : Polypropylene	1H : 50V		N : ± 30%
ECET : Electrolytic	1V : 35V		P : +100%, −0%
ECEA..... N: Non Polar Electrolytic	50 : 50V		
ECBT : Axial Leaded Type Ceramic	25 : 25V		
	2A : 100V		
	1J : 63V		

Ref. No.	Part No.	Value
RESISTORS		
R1,2	ERD10TLJ391U	390
R3,4	ERD10TLJ224U	220K
R5,6	ER010MKG5622	56.2K
R7,8	ERD10TLJ271U	270
R9,10	ERD10TLJ680U	68
R11,12	ERD10TLJ184U	180K
R13,14	ERD10TLJ123U	12K
R15,16	ERD10TLJ563U	56K
R17,18	ERD10TLJ102U	1K
R71,72	ERD10TLJ334U	330K
R73,74	ERD10TLJ102U	1K
R75,76	ERD10TLJ124U	120K
R77,78	ERD10TLJ103U	10K
R79,80	ERD10TLJ220U	22
R202 Ⓢ	ERD25FJ331	330
R203 Ⓢ	ERD25FJ561	560
R204 Ⓢ	ERD25FJ331	330
R205 Ⓢ	ERD25TJ824	820K
R206 Ⓢ	ERD25TJ273	27K
R207 Ⓢ	ERD25TJ153	15K
R208 Ⓢ	ERD25FJ103	10K
R209 Ⓢ	ERD25FJ182	1.8K
R210 Ⓢ	ERD25FJ682	6.8K
R211 Ⓢ	ERD25FJ181	180
R212 Ⓢ	ERD25TJ683	68K
R213 Ⓢ	ERD25TJ473	47K
R215 Ⓢ	ERD25FJ562	5.6K
R216 Ⓢ	ERD25FJ103	10K
R217 Ⓢ	ERD25FJ391	390
R218 Ⓢ	ERD25FJ272	2.7K
R219 Ⓢ	ERD25TJ123	12K
R220 Ⓢ	ERD25TJ223	22K
R221 Ⓢ	ERD25FJ821	820
R222 Ⓢ	ERD25TJ333	33K
R223 Ⓢ	ERD25TJ473	47K
R224 Ⓢ	ERD25FJ103	10K
R225 Ⓢ	ERD25TJ473	47K
R226 Ⓢ	ERD25FJ561	560
R227 Ⓢ	ERD25FJ821	820
R228 Ⓢ	ERD25FJ391	390
R229 Ⓢ	ERD25FJ181	180
R230 Ⓢ	ERD25FJ562	5.6K
R231 Ⓢ	ERD25FJ102	1K

Ref. No.	Part No.	Value
RESISTORS		
R232 Ⓢ	ERD25TJ104	100K
R233 Ⓢ	ERD25FJ821	820
R234 Ⓢ	ERD25TJ333	33K
R235 Ⓢ	ERD25FJ103	10K
R236 Ⓢ	ERD25TJ223	22K
R237 Ⓢ	ERD25FJ822	8.2K
R238 Ⓢ	ERD25FJ102	1K
R239 Ⓢ	ERD25TJ104	100K
R240 Ⓢ	ERD25TJ473	47K
R241 Ⓢ	ERD25FJ103	10K
R242 Ⓢ	ERD25TJ273	27K
R243 Ⓢ	ERD25TJ473	47K
R244 Ⓢ	ERD25TJ563	56K
R245 Ⓢ	ERD25FJ103	10K
R246 Ⓢ	ERD25TJ333	33K
R247 Ⓢ	ERD25FJ472	4.7K
R248 Ⓢ	ERD25FJ391	390
R249 Ⓢ	ERD25FJ472	4.7K
R250 Ⓢ	ERD25FJ221	220
R290 ⚠	ERDS1FJ823	82K
R291 Ⓢ	ERD25TJ683	68K
R301 Ⓢ	ERD25FJ151	150
R302,303 Ⓢ	ERD25TJ223	22K
R304 Ⓢ	ERD25TJ153	15K
R305 Ⓢ	ERD25FJ102	1K
R306,307 Ⓢ	ERD25FJ392	3.9K
R308,309 Ⓢ	ERD25TJ104	100K
R310,311 Ⓢ	ERD25TJ104	100K
R312 Ⓢ	ERD25FJ103	10K
R313,314 Ⓢ	ERD25TJ104	100K
R315 Ⓢ	ERD25FJ222	2.2K
R401,402 Ⓢ	ERD25FJ561	560
R403,404 Ⓢ	ERD25TJ224	220K
R405,406 Ⓢ	ERD25TJ224	220K
R407,408 Ⓢ	ERD25TJ124	120K
R409,410 Ⓢ	ERD25TJ153	15K
R411,412 Ⓢ	ERD25FJ152	1.5K
R415,416 Ⓢ	ERD25FJ103	10K
R417 Ⓢ	ERD25FJ332	3.3K
R418,419 Ⓢ	ERD25TJ153	15K
R420,421 Ⓢ	ERD25TJ153	15K
R422,423 Ⓢ	ERD25TJ153	15K
R424 Ⓢ	ERD25FJ471	470

Ref. No.	Part No.	Value
RESISTORS		
R425,426 Ⓢ	ERD25FJ561	560
R427 Ⓢ	ERD25TJ394	390K
R428 Ⓢ	ERD25TJ334	330K
R429 Ⓢ	ERD25FJ181	180
R430 Ⓢ	ERD25FJ103	10K
R431,432 Ⓢ	ERD25FJ562	5.6K
R433,434 Ⓢ	ERD25FJ562	5.6K
R435,436 Ⓢ	ERD25FJ102	1K
R437 Ⓢ	ERD25TJ224	220K
R438 Ⓢ	ERD25FJ103	10K
R440 Ⓢ	ERD25FJ561	560
R441 Ⓢ	ERD25TJ393	39K
R442 Ⓢ	ERD25FJ561	560
R443 Ⓢ	ERG1ANJ271	270
R444,445 Ⓢ	ERD25TJ224	220K
R446,447 Ⓢ	ERD25FJ101	100
R448 Ⓢ	ERD25FJ222	2.2K
R450,451 Ⓢ	ERD25TJ153	15K
R452 Ⓢ	ERD25TJ153	15K
R461,462 Ⓢ	ERD25FJ331	330
R470,471(MC) only ⚠	ERD25FJ100	10
R498,499 Ⓢ	ERD25FJ681	680
R501,502 Ⓢ	ERD25FJ331	330
R503,504 Ⓢ	ERD25FJ272	2.7K
R505,506 Ⓢ	ERD25TJ154	150K
R507,508 Ⓢ	ERD25TJ223	22K
R509,510 Ⓢ	ERD25TJ333	33K
R511,512 Ⓢ	ERD25TJ183	18K
R513,514 Ⓢ	ERD25TJ123	12K
R517,518 Ⓢ	ERD25FJ103	10K
R519 Ⓢ	ERD25FJ103	10K
R524 Ⓢ	ERD25FJ153	15K
R525 Ⓢ	ERD25FJ153	15K
R526 Ⓢ	ERD25TJ223	22K
R527 Ⓢ	ERD25TJ183	18K
R528 Ⓢ	ERD25TJ223	22K
R529 Ⓢ	ERD25TJ183	18K
R536 Ⓢ	ERD25FJ472	4.7K
R540 Ⓢ	ERD25FJ472	4.7K
R543 Ⓢ	ERD25FJ222	2.2K

Ref. No.	Part No.	Value
RESISTORS		
R545 Ⓢ	ERD25TJ473	47K
R546 Ⓢ	ERD25FJ562	5.6K
R547 Ⓢ	ERD25FJ103	10K
R551 Ⓢ	ERD25FJ271	270
R552 ⚠	ERDS1FJ122	1.2K
R553 Ⓢ	ERD25TJ223	22K
R554 Ⓢ	ERD25FJ681	680
R555 Ⓢ	ERD25FJ562	5.6K
R556 Ⓢ	ERD25FJ560	56
R557 Ⓢ	ERD25FJ181	180
R558,559 Ⓢ	ERD25FJ151	150
R560,561 Ⓢ	ERD25FJ271	270
R562 Ⓢ	ERD25FJ271	270
R563 Ⓢ	ERD25FJ561	560
R564 Ⓢ	ERD25FJ820	82
R601,602 Ⓢ	ERD25TJ824	820K
R603,604 Ⓢ	ERD25TJ824	820K
R605,606 Ⓢ	ERD25TJ474	470K
R607,608 Ⓢ	ERD25TJ474	470K
R609,610 Ⓢ	ERD25FJ392	3.9K
R611,612 Ⓢ	ERD25FJ102	1K
R613,614 Ⓢ	ERD25TJ223	22K
R615,616 Ⓢ	ERD25FJ332	3.3K
R617,618 Ⓢ	ERD25TJ393	39K
R619,620 Ⓢ	ERD25TJ474	470K
R621,622 Ⓢ	ERD25FJ102	1K
R623,624 Ⓢ	ERD25FJ103	10K
R625,626 Ⓢ	ERD25FJ471	470
R627,628 ⚠	ERDS1FJ6R8	6.8
R629,630 ⚠	ERDS1FJ332	3.3K
R631,632 ⚠	ERDS1FJ821	820
R633,634 ⚠	ERDS1FJ470	47
R635,636 ⚠	ERDS1FJ182	1.8K
R637,638 Ⓢ	ERD25TJ223	22K
R639,640 ⚠	ERDS1FJ331	330
R641,642 ⚠Ⓢ	ERD25TJ184	180K
R643,644 ⚠Ⓢ	ERD25TJ184	180K
R645,646 Ⓢ	ERG1ANJ100	10
R647,648 Ⓢ	ERG1ANJ100	10
R649,650 Ⓢ	ERD25FJ472	4.7K
R651,652 Ⓢ	ER025CKF1203	120K
R653,654 Ⓢ	ERD25FJ822	8.2K
R655,656 Ⓢ	ERD25TJ333	33K
R657,658 Ⓢ	ERG1ANJ331	330

Ref. No.	Part No.	Value
RESISTORS		
R659,660 ⚠	ERDS1FJ681	680
R661,662 ⚠	ERDS1FJ681	680
R663 Ⓢ	ERD25TJ473	47K
R664 ⚠	ERDS1FJ332	3.3K
R665 ⚠Ⓢ	ERD25FJ560	56
R666 ⚠	ERDS1FJ470	47
R667,668 Ⓢ	ERD25FJ681	680
R671,672 Ⓢ	ERD25FJ272	2.7K
R801,802 Ⓢ	ERD25FJ332	3.3K
R803,804 Ⓢ	ERD25FJ470	47
R805,806 Ⓢ	ERD25FJ562	5.6K
R807,808 Ⓢ	ERD25TJ334	330K
R809,810 Ⓢ	ERD25FJ821	820
R811,812 Ⓢ	ERD25TJ824	820K
R813,814 Ⓢ	ERD25FJ682	6.8K
R815,816 Ⓢ	ERD25FJ682	6.8K
R817,818 Ⓢ	ERD25TJ223	22K
R819,820 Ⓢ	ERD25TJ223	22K
R821 Ⓢ	ERD25TJ223	22K
R822 Ⓢ	ERD25TJ823	82K

Ref. No.	Part No.	Value
RESISTORS		
R823,824 Ⓢ	ERD25TJ223	22K
R825 Ⓢ	ERD25TJ333	33K
R826,827 Ⓢ	ERD25TJ823	82K
R828 Ⓢ	ERD25TJ473	47K
R829 Ⓢ	ERD25TJ184	180K
R830(M) Ⓢ	ERD25TJ273	27K
R830(MC)	ERD25TJ123	12K
R831 ⚠Ⓢ	ERD25TJ823	82K
R832 Ⓢ	ERD25TJ183	18K
R833 ⚠Ⓢ	ERD25FJ562	5.6K
R834 Ⓢ	ERG1ANJ820	82
R836 Ⓢ	ERD25FJ272	2.7K
R837 Ⓢ	ERD25FJ222	2.2K
R838 Ⓢ	ERD25FJ272	2.7K
R839 Ⓢ	ERD25FJ222	2.2K
R840 Ⓢ	ERD25FJ102	1K
R841 ⚠Ⓢ	ERG2ANJ270	27
R842 ⚠	ERDS1FJ272	2.7K
R843 Ⓢ	ERD25FJ182	1.8K
R844 ⚠	ERDS1FJ221	220

Ref. No.	Part No.	Value
RESISTORS		
R845 ⚠	ERDS1FJ101	100
R846 Ⓢ	ERD25FJ821	820
R847 Ⓢ	ERD25FJ102	1K
R848,849 ⚠	ERDS1FJ220	22
R850 Ⓢ	ERD25FJ272	2.7K
R851 ⚠Ⓢ	ERG1ANJ271	270
R852 ⚠Ⓢ	ERG2ANJ681	680
R853 Ⓢ	ERG2ANJ271	270
R854(M) Ⓢ	ERD25TJ473	47K
R854(MC)	ERD25TJ273	27K
R855	ERDS1FJ2R2	2.2
R901 Ⓢ	ERD25FJ102	1K
R902 Ⓢ	ERD25FJ561	560
R903 Ⓢ	ERD25FJ682	6.8K
R904 Ⓢ	ERD25FJ103	10K
R905 Ⓢ	ERD25FJ101	100
R906 Ⓢ	ERD25FJ151	150
R907 Ⓢ	ERD25FJ103	10K
R908 Ⓢ	ERD25TJ273	27K
R909 ⚠	ERDS1FJ680	68

Ref. No.	Part No.	Value
RESISTORS		
R910 Ⓢ	ERD25FJ681	680
R911 Ⓢ	ERD25FJ103	10K
R912 Ⓢ	ERD25TJ224	220K
R913 Ⓢ	ERD25TJ154	150K
R914 Ⓢ	ERD25TJ104	100K
R920 Ⓢ	ERD25TJ824	820K
R921 Ⓢ	ERD25TJ473	47K
R922 Ⓢ	ERD25TJ333	33K
R923 Ⓢ	ERD25FJ151	150
R924 Ⓢ	ERD25TJ104	100K
R925 Ⓢ	ERD25TJ473	47K
R926 Ⓢ	ERD25TJ224	220K
R927 Ⓢ	ERD25FJ221	220
R928 Ⓢ	ERD25TJ223	22K
R929 Ⓢ	ERD25TJ684	680K
R1001 ⚠Ⓢ	ERC12ZGK335	3.3M

Ref. No.	Part No.	Value
CAPACITORS		
C1,2 Ⓢ	ECEA50Z3R3	3.3
C3,4 Ⓢ	ECCD1H101K	100P
C5,6 Ⓢ	ECKD1H471KB	470P
C7,8 Ⓢ	ECQM1H223JZ	0.022
C9,10 Ⓢ	ECQM1H682JZ	0.0068
C11,12 ⚠	ECEA1HN010S	1
C13,14 Ⓢ	ECEA1CS330	33
C71,72 Ⓢ	ECEA50Z3R3	3.3
C73,74 Ⓢ	ECCD1H390K	39P
C75,76 Ⓢ	ECCD1H820K	82P
C77,78 Ⓢ	ECKD1H391KB	390P
C201	ECBT1C103ZYY	0.01
C202,203	ECBT1C223NYY	0.022
C205,206	ECBT1C223NYY	0.022
C207	ECBT1C223NYY	0.022
C208 Ⓢ	ECCD1H101K	100P
C210,211 Ⓢ	ECEA50Z1	1
C212 Ⓢ	ECEA25Z4R7	4.7
C213 Ⓢ	ECEA50Z1	1
C214,215	ECBT1C223NYY	0.022
C216 Ⓢ	ECEA1HS100	10
C217,218	ECBT1C223NYY	0.022
C219	ECBT1C223NYY	0.022
C220 Ⓢ	ECEA50ZR47	0.47
C222	ECBT1H102ZXY	0.001
C223 Ⓢ	ECCD1H150KC	15P
C224 Ⓢ	ECQM1H473JZ	0.047
C225 Ⓢ	ECCD1H120KC	12P
C226	ECQP1471JZ	470P
C228 Ⓢ	ECEA1AS101	100
C229 Ⓢ	ECEA1CS330	33
C230 Ⓢ	ECEA1CS330	33
C231 Ⓢ	ECQM1H183JZ	0.018
C233	ECBT1C223NYY	0.022
C234,235	ECBT1C103ZYY	0.01
C237 Ⓢ	ECKD1H103ZF	0.01
C238 Ⓢ	ECEA50Z2R2	2.2
C298,299 Ⓢ	ECKD1H103ZF	0.01

Ref. No.	Part No.	Value
CAPACITORS		
C301 Ⓢ	ECEA1CS221	220
C302,303 Ⓢ	ECQM1H223JZ	0.022
C304,305 Ⓢ	ECEA50ZR47	0.47
C306	ECQP1471JZ	470P
C307 Ⓢ	ECEA50Z1	1
C309 Ⓢ	ECQM1H473JZ	0.047
C310 Ⓢ	ECEA50ZR47	0.47
C311 Ⓢ	ECEA50Z3R3	3.3
C312 Ⓢ	ECEA50Z1	1
C313	ECBT1C103ZYY	0.01
C401,402 Ⓢ	ECEA25Z4R7	4.7
C405,406 Ⓢ	ECEA1ES470	47
C407,408 Ⓢ	ECCD1H330K	33P
C409,410 Ⓢ	ECQM1H104JZ	0.1
C411,412 Ⓢ	ECEA1HS100	10
C413 Ⓢ	ECEA1HS100	10
C414 Ⓢ	ECEA25Z4R7	4.7
C415 Ⓢ	ECEA1AS470	47
C417 Ⓢ	ECQM1H473JZ	0.047
C418 Ⓢ	ECEA50Z1	1
C419 Ⓢ	ECEA1AS331	330
C421 Ⓢ	ECKD1H473ZF	0.047
C422,423 Ⓢ	ECEA50Z3R3	3.3
C424 Ⓢ	ECKD1H473ZF	0.047
C425 Ⓢ	ECCD1H151K	150P
C426 Ⓢ	ECCD1H151K	150P
C427 Ⓢ	ECKD1H473ZF	0.047
C428 Ⓢ	ECEA25Z4R7	4.7
C429,430 Ⓢ	ECKD1H473ZF	0.047
C501,502 Ⓢ	ECEA50Z1	1
C503,504 Ⓢ	ECEA50Z3R3	3.3
C505 ⚠	ECEA1CN470S	47
C508 Ⓢ	ECCD1H151K	150P
C510 Ⓢ	ECEA50Z3R3	3.3
C511 Ⓢ	ECEA25Z4R7	4.7
C513 Ⓢ	ECEA50Z3R3	3.3
C521 Ⓢ	ECKD1H223ZF	0.022
C522 Ⓢ	ECEA1AS221	220

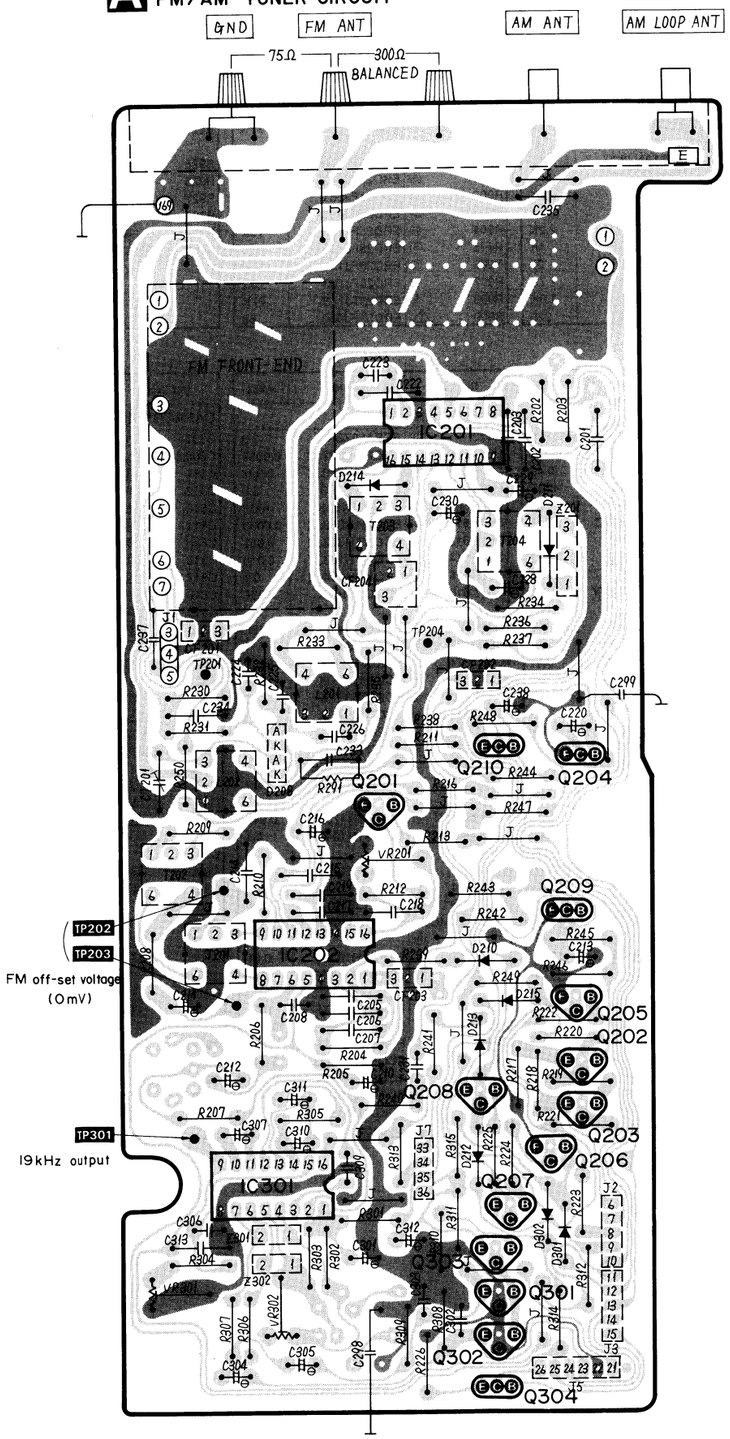
Ref. No.	Part No.	Value
CAPACITORS		
C523 Ⓢ	ECEA50Z3R3	3.3
C601,602 Ⓢ	ECQM1H822JZ	0.0082
C603,604 Ⓢ	ECQM1H273JZ	0.027
C605,606 Ⓢ	ECEA50Z3R3	3.3
C607,608 Ⓢ	ECCD1H101K	100P
C609,610 Ⓢ	ECQM1H332JZ	0.0033
C611,612 Ⓢ	ECQM1H333JZ	0.033
C613,614 Ⓢ	ECQM1H183JZ	0.018
C615,616 Ⓢ	ECQM1H104JZ	0.1
C617,618 Ⓢ	ECCD1H101K	100P
C619,620 Ⓢ	ECCD1H390K	39P
C621,622 Ⓢ	ECEA50Z1	1
C623,624 Ⓢ	ECKD1H821KB	820P
C625,626 Ⓢ	ECCD1H220K	22P
C627,628 Ⓢ	ECEA2AS3R3	3.3
C629,630 ⚠Ⓢ	ECCD1H560K	56P
C631,632 Ⓢ	ECEA50Z1	1
C633,634 ⚠Ⓢ	ECCD1H560K	56P
C635,636 Ⓢ	ECKD1H681KB	680P
C637,638 Ⓢ	ECKD1H681KB	680P
C639,640(M) Ⓢ	ECQM1H473JZ	0.047
C639,640(MC)	ECQM1H104JZ	0.1
	Ⓢ	
C641,642 Ⓢ	ECEA1CS330	33
C643,644 Ⓢ	ECCD1H030CC	3P
C645,646 Ⓢ	ECEA1JS101	100
C651,652(MC)	ECQM1H104JZ	0.1
	Ⓢ	
C653,654 Ⓢ	ECKD1H103ZF	0.01
C655 Ⓢ	ECKD1H473ZF	0.047
C696 Ⓢ	ECKD1H103ZF	0.01
C697,698 Ⓢ	ECKD1H102ZF	0.001
C699 Ⓢ	ECKD1H103ZF	0.01
C801,802 Ⓢ	ECQM1H473JZ	0.047
C803 Ⓢ	ECQM1H683JZ	0.068
C804 Ⓢ	ECEA25Z4R7	4.7
C805 Ⓢ	ECKD1H103ZF	0.01
C806 Ⓢ	ECEA50Z1	1

Ref. No.	Part No.	Value
CAPACITORS		
C807 Ⓢ	ECEA50Z1	1
C808,809 ⚠	ECETS56V822U	8200
C811 Ⓢ	ECEA1AS470	47
C812 Ⓢ	ECKD1H103ZF	0.01
C813 Ⓢ	ECEA1AS470	47
C814 Ⓢ	ECEA1HS470	47
C815 Ⓢ	ECKD1H103ZF	0.01
C816 Ⓢ	ECEA1VS101	100
C817 ⚠	ECEA1HU471	470
C818 ⚠Ⓢ	ECEA1HS331	330
C819 Ⓢ	ECKD1H103ZF	0.01
C820 Ⓢ	ECEA1ES470	47
C821 Ⓢ	ECEA1ES101	100
C822 Ⓢ	ECKD1H103ZF	0.01
C823 Ⓢ	ECEA1AS470	47
C824 ⚠	ECEA1VU102	1000
C825 ⚠Ⓢ	ECKD2H103PE	0.01
C830,831 ⚠Ⓢ	ECKD2H103PE	0.01
C832	ECEA1HU471	470
C833 Ⓢ	ECKD1H103ZF	0.01
C834 Ⓢ	ECEA1ES470	47
C835 ⚠	ECEA1HNR47S	0.47
C901	ECBT1C103ZYY	0.01
C902 Ⓢ	ECEA25M4R7R	4.7
C903 Ⓢ	ECEA1HS100	10
C904,905	ECBT1C103ZYY	0.01
C906	ECEA0JU102	1000
C907 Ⓢ	ECCD1H070CC	7P
C908 Ⓢ	ECCD1H180KC	18P
C909	ECEA0JU102	1000
C910 Ⓢ	ECEA1HS470	47
C911 Ⓢ	ECEA1VS330	33
C912 Ⓢ	ECEA1HS100	10
C913 Ⓢ	ECEA1AS221	220
C914,915 Ⓢ	ECEA50Z1	1
C916 Ⓢ	ECEA50Z1	1
C1001 ⚠	ECKDKC103PF2	0.01

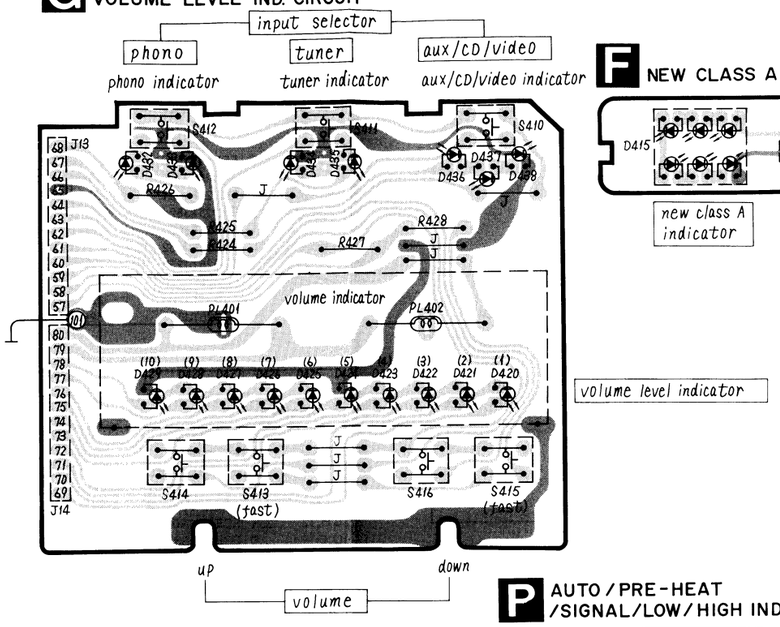
■ PRINTED CIRCUIT BOARDS

Ground (Earth) lines

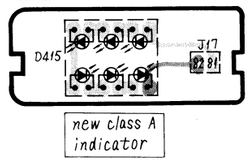
A FM/AM TUNER CIRCUIT



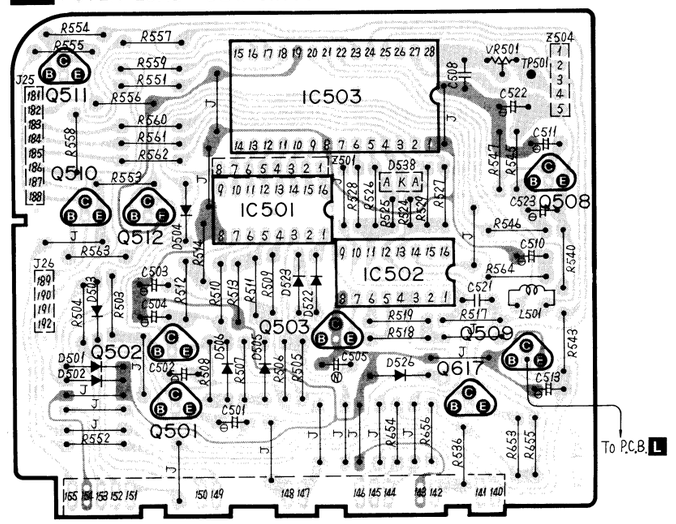
G VOLUME LEVEL IND. CIRCUIT



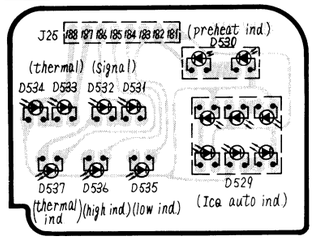
F NEW CLASS A IND.



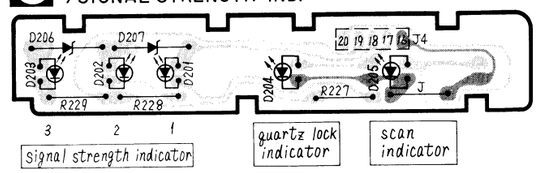
K Icq CONTROLLER/RELAY DRIVE /OVER LOAD DET. CIRCUIT



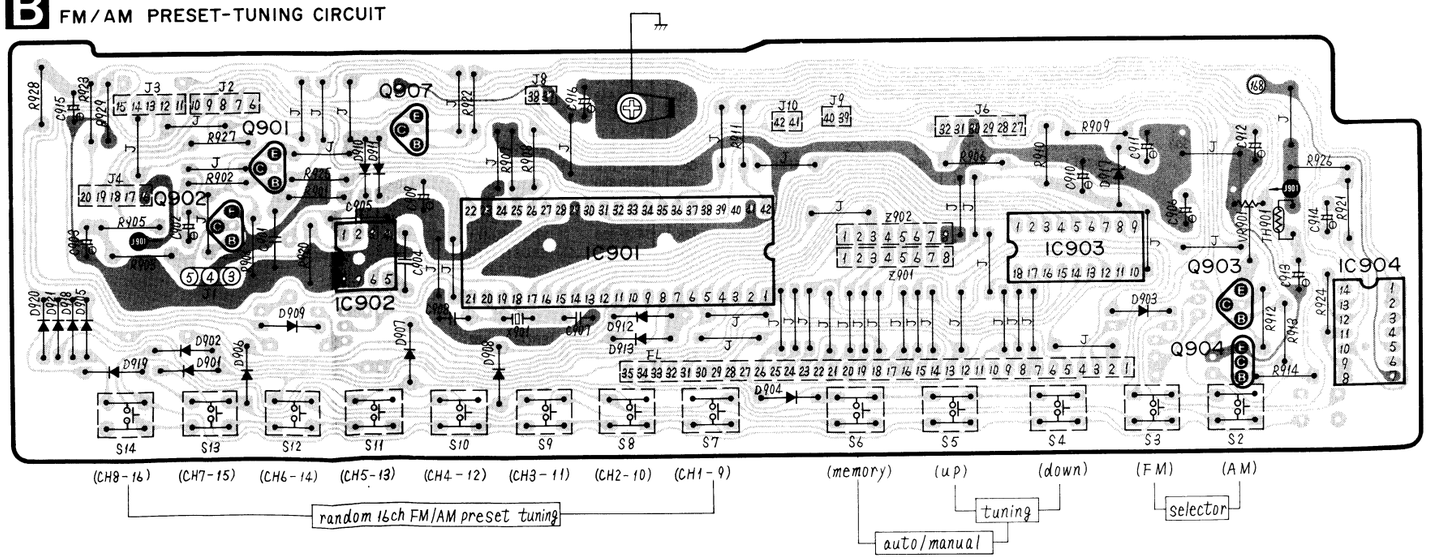
P AUTO/PRE-HEAT /SIGNAL/LOW/HIGH IND.



C AUTO SCAN/QUARTZ LOCK /SIGNAL STRENGTH IND.



B FM/AM PRESET-TUNING CIRCUIT



L TONE CONTROL / POWER AMP. / REGULATOR CIRCUIT

Load impedance det.
(L ch) TP801
(R ch) TP802

J VOLTAGE AMPLIFIER CIRCUIT

Q POWER SWITCH

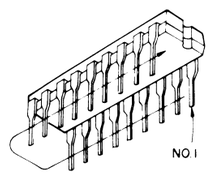
GCMK-47X
F1 125V 4A

M HEADPHONES JACK

N SPEAKER SELECTOR

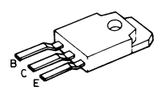
O STAND BY / ON IND.

• Terminal guide of transistors, diodes and IC's

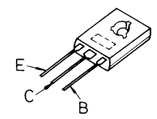


AN6558F	8pin
SVIUPB553C-E	
AN7062	18pin
MN6631	
MN6632	
AN6873N	
SVITD62501P	16pin
SVIUPC1018C	
SVIUPC1167C2	
SVIUPC1161C3	
SVITA7612AP	
MN1421STA	28pin
SVIUPD4011BC	14pin

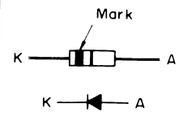
2SC3182, 2SA1265



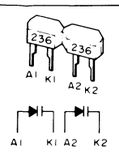
2SC2824, 2SA1184



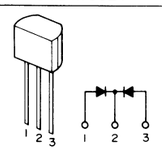
MA162A



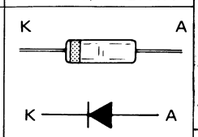
SVDKV1236Z



SVDMC921

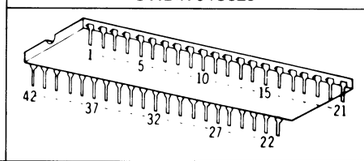


MA150, MA27WA

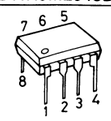


2SA1123, 2SC1685
2SA564A, 2SC2631
2SC1383, 2SJ103
2SA992, 2SC945
2SA684NC 2SD1011
2SC1509, 2SC1845

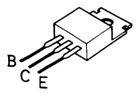
SVID1704C525



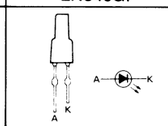
AN6552
SVINJ4559DSM
SVINJM2043DD



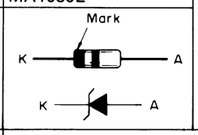
2SD762

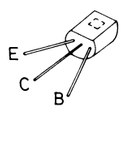


SVDAY5533K-M
LN846RP
LN346GP

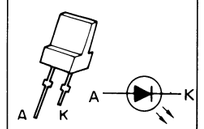


MA1062M, MA1270M
MA1160L, MA1180M
MA1030L

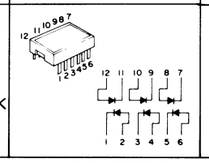




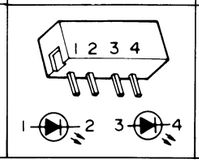
LN446YP



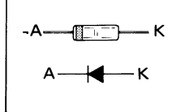
LN0603GP3G



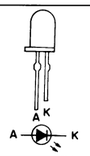
LN0202YP4



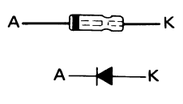
OA90



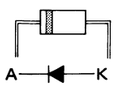
LN41YPHLMS



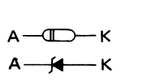
20A90

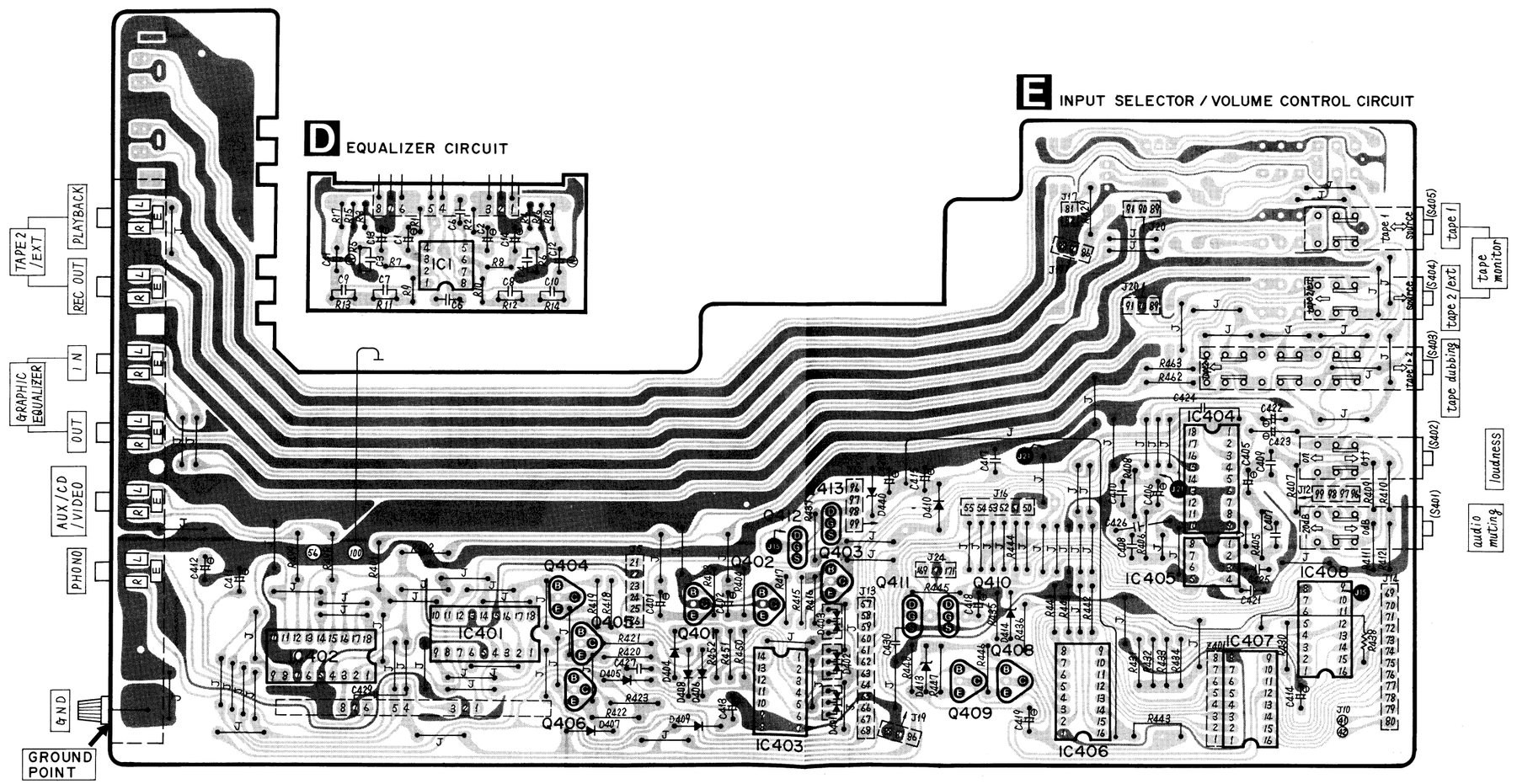


SVDSR1K2
SVDS3V20

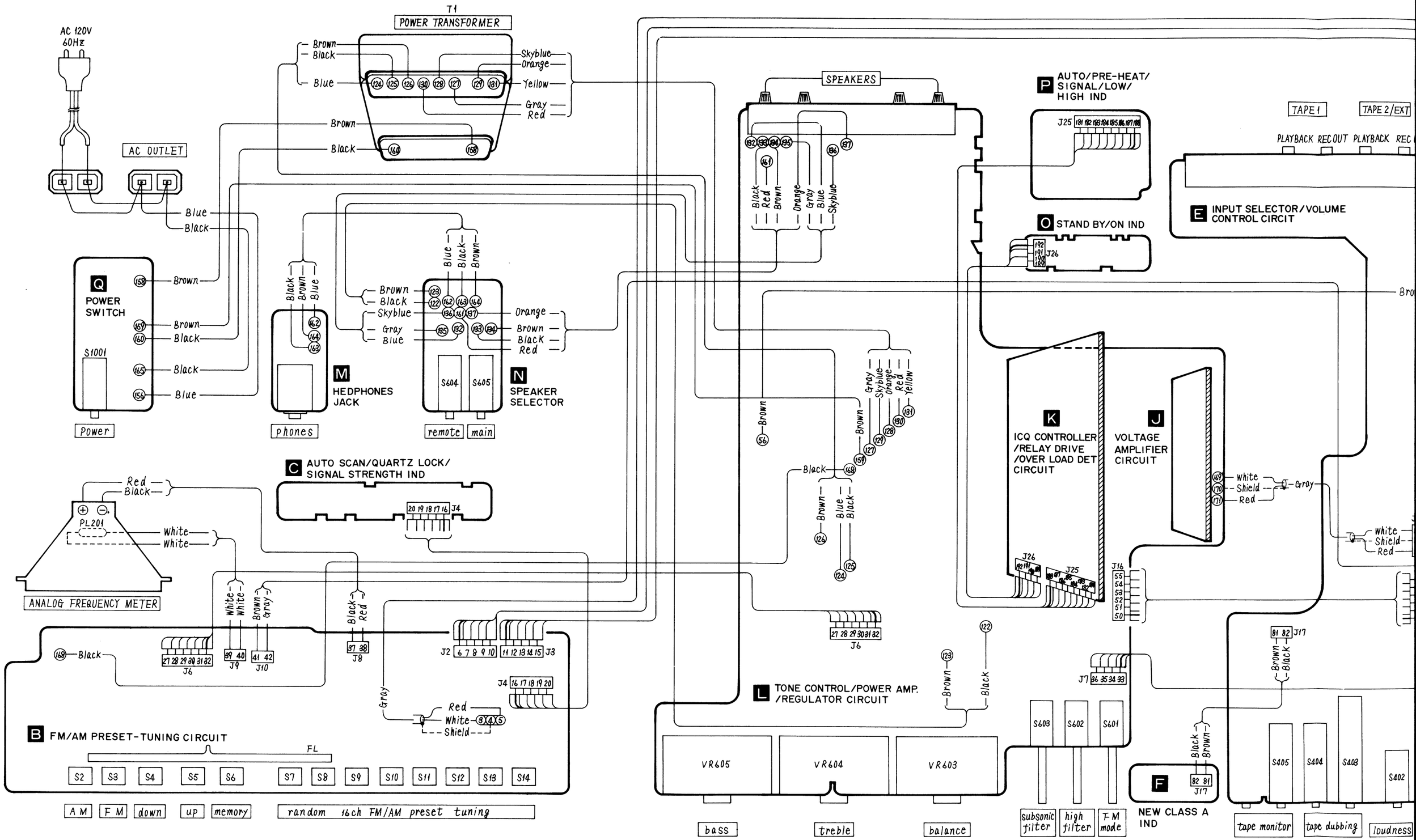


SVDMZ303B
SVDMZ309A
SVDMZ308B

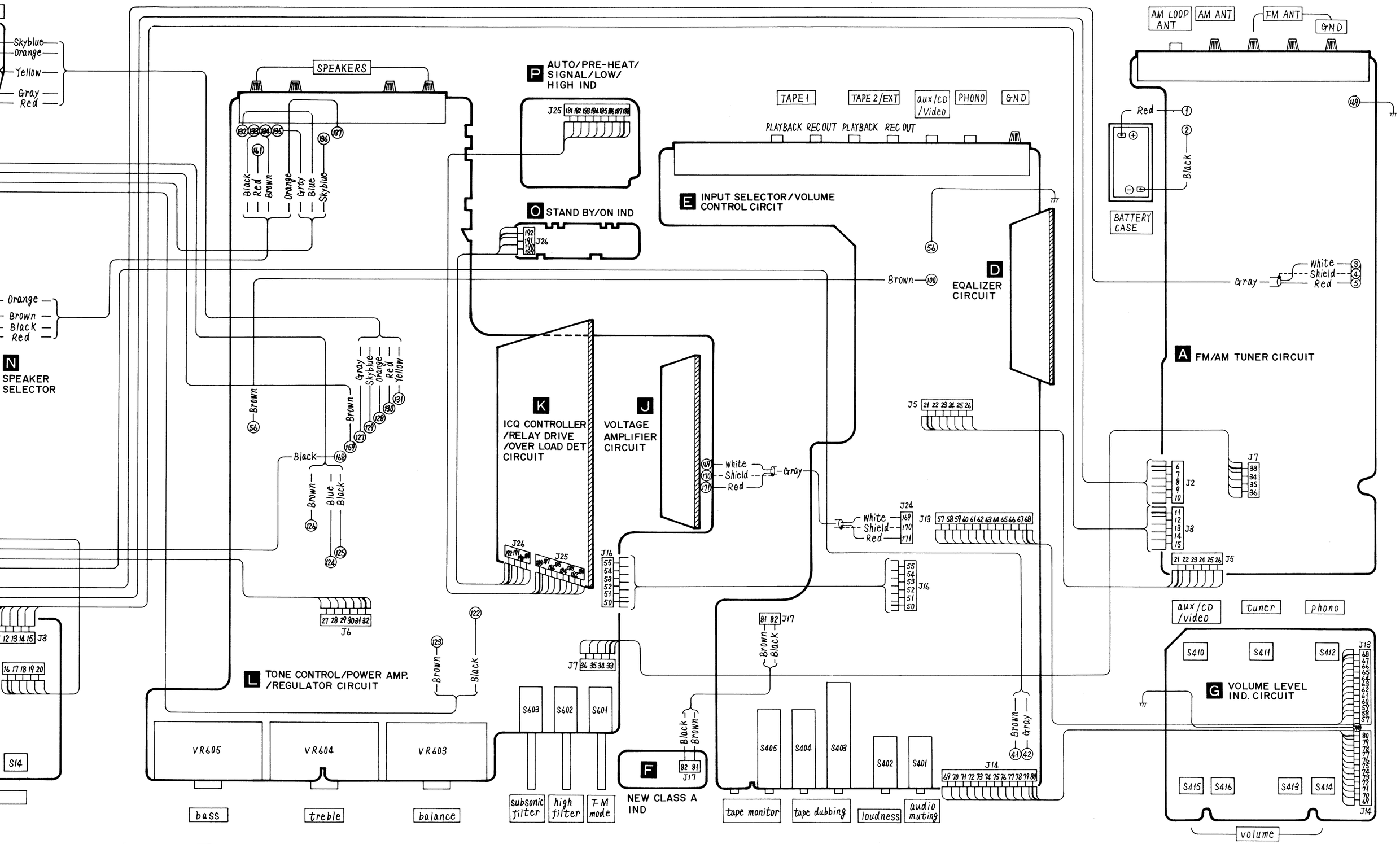




■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM (Top View)

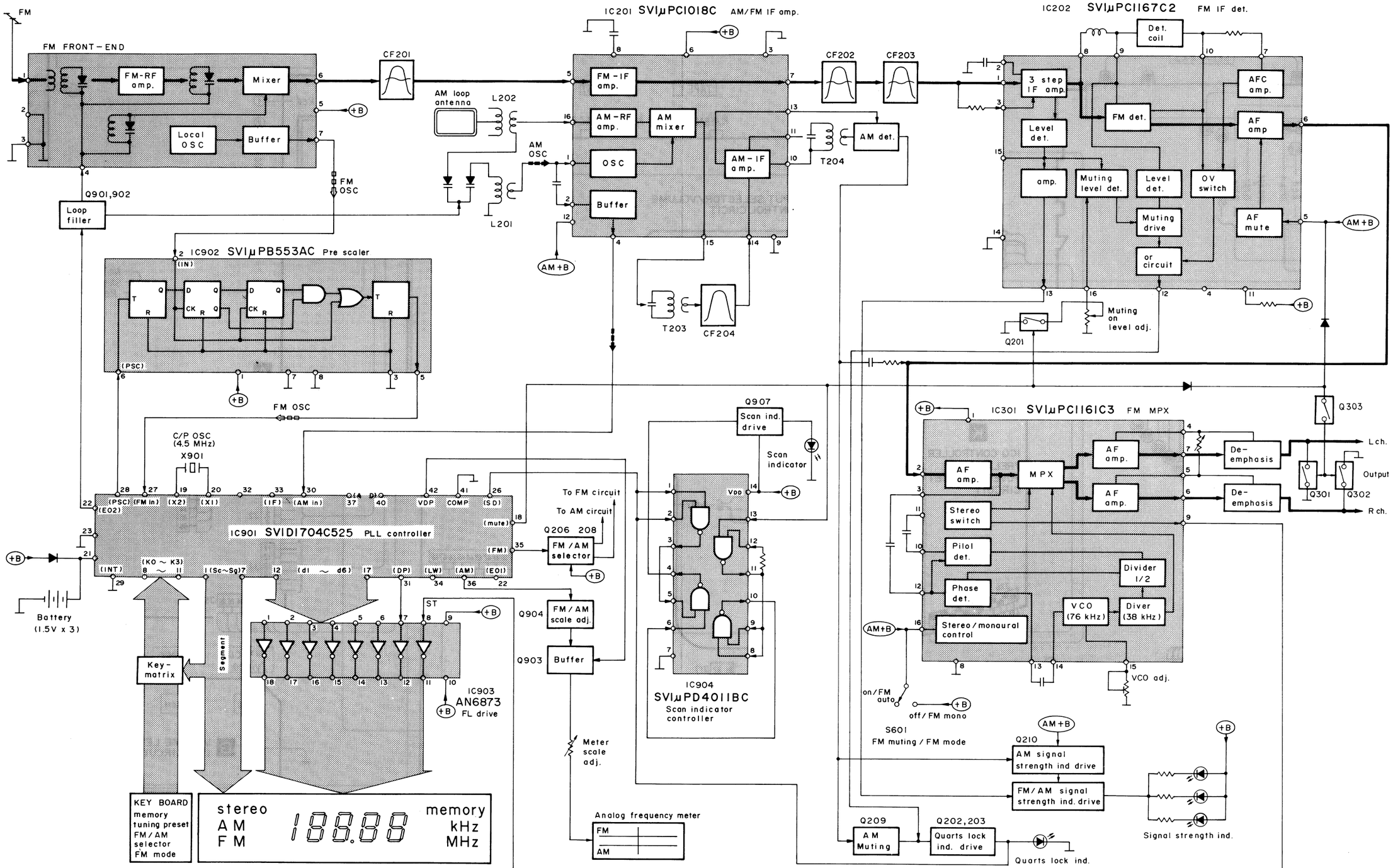


(Top View)


Skyblue
Orange
Yellow
Gray
Red
SPEAKERS
Black
Red
Brown
Orange
Gray
Blue
Skyblue
P AUTO/PRE-HEAT/ SIGNAL/LOW/ HIGH IND
J25
O STAND BY/ON IND
J26
TAPE 1
TAPE 2/EXT
aux/CD /Video
PHONO
GND
PLAYBACK REC OUT PLAYBACK REC OUT
E INPUT SELECTOR/VOLUME CONTROL CIRCIT
D EQALIZER CIRCUIT
AM LOOP ANT
AM ANT
FM ANT
GND
Red
Black
BATTERY CASE
White
Shield
Red
Gray
A FM/AM TUNER CIRCUIT
Orange
Brown
Black
Red
N SPEAKER SELECTOR
Gray
Skyblue
Orange
Red
Yellow
Brown
Black
Brown
Blue
Black
K ICQ CONTROLLER /RELAY DRIVE /OVER LOAD DET CIRCUIT
J VOLTAGE AMPLIFIER CIRCUIT
J5
J7
J2
J3
J16
J24
J13
J6
J17
L TONE CONTROL/POWER AMP. /REGULATOR CIRCUIT
aux/CD /video
tuner
phono
S410
S411
S412
G VOLUME LEVEL IND. CIRCUIT
S14
VR605
VR604
VR603
S603
S602
S601
S405
S404
S403
S402
S401
J14
F NEW CLASS A IND
S415
S416
S413
S414
bass
treble
balance
subsonic filter
high filter
FM mode
tape monitor
tape dubbing
loudness
audio muting
volume

■ BLOCK DIAGRAM

• Tuner (FM/AM) circuit

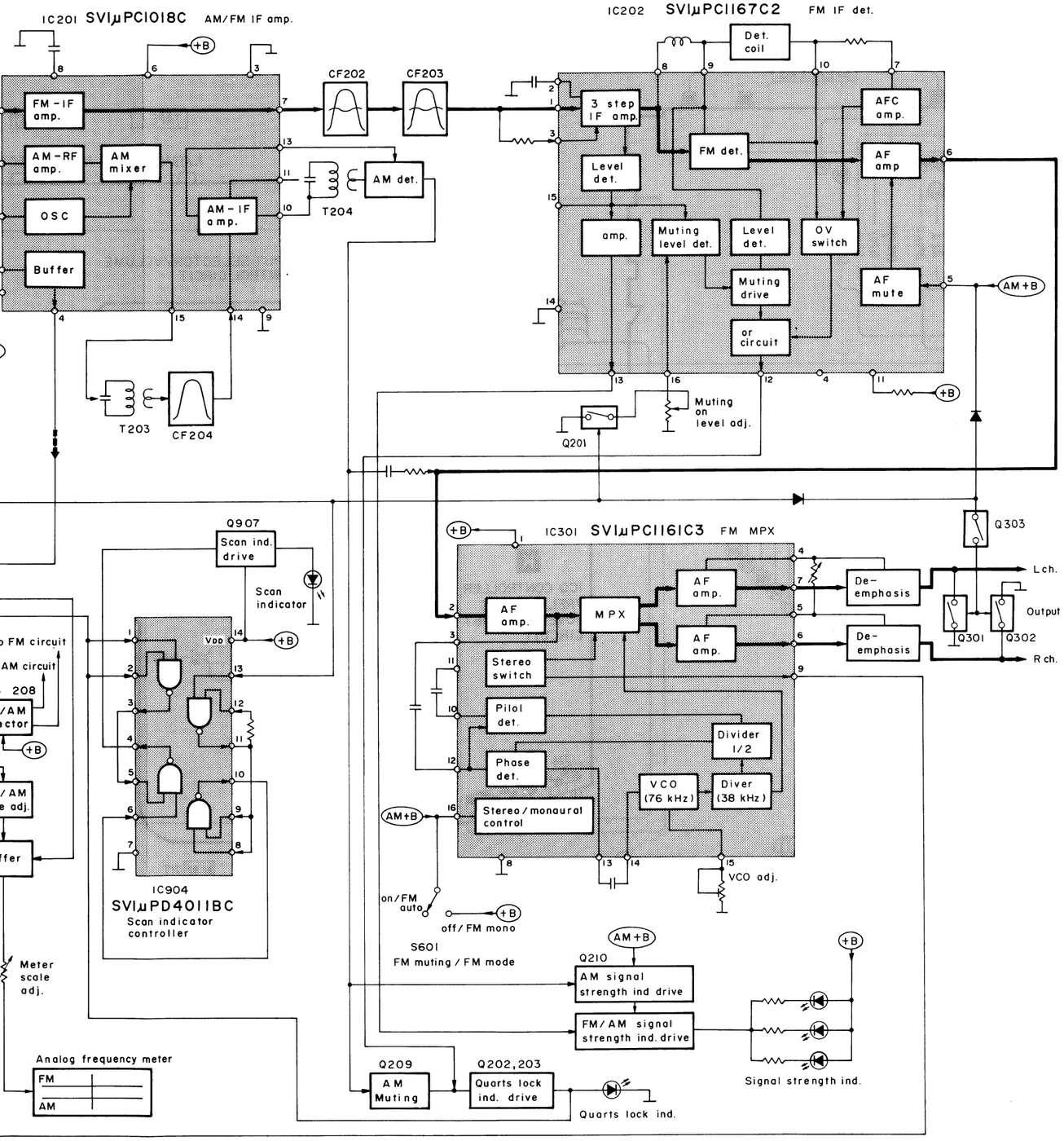


* Power amplifier, volume control and other block diagram, refer on page 35.

■ FUNCTION OF

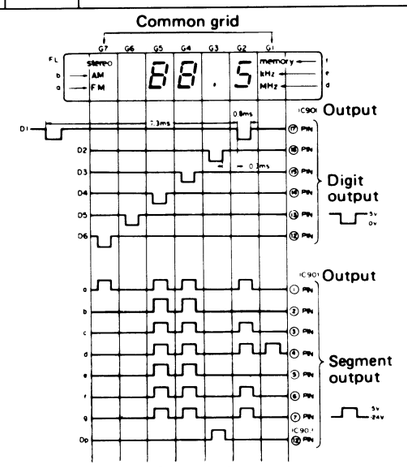
Pin No.	Mark	D
1	Sa	Segment sign (Refer to Fig
2	Sb	
3	Sc	
4	Sd	
5	Se	
6	Sf	
7	Sg	
8	K0	Input termi external key terminals (a signal source
9	K1	
10	K2	
11	K3	
12	D6	Digit signal (Refer to Fig
13	D5	
14	D4	
15	D3	
16	D2	
17	D1	
18	MT	This is the shock noise When the output from Powe Muting
19	X2	Connecting The crystal c
20	X1	
21	VDD	Power supply
22	E01	When the higher than output is del When it is delivered. floating.
23	GND	Ground term
24	E02	Not used in
25	CE	This is the the device. the level hig the level low When this te ment (a ~ g are off, but Power The during
26	SD	This input t a broadcasti during recep
27	FM	Input termin divided to 1/

* Power amplifier, volume control and other block diagram, refer on page 35.



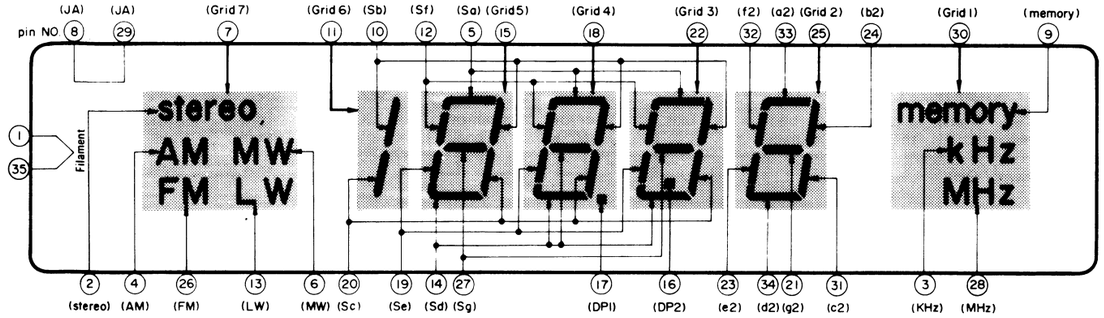
■ FUNCTION OF TERMINAL (PLL CONTROLLER IC901)

Pin No.	Mark	Description of terminal
1	Sa	Segment signal output terminal for display. (Refer to Fig. 21)
2	Sb	
3	Sc	
4	Sd	
5	Se	
6	Sf	
7	Sg	
8	K0	Input terminal for key return signal from external key matrix. The output of segment terminals (a ~ g) is used as the key return signal source. 1ms, 4V, 0V
9	K1	
10	K2	
11	K3	
12	D6	Digit signal output terminal for display. (Refer to Fig. 21)
13	D5	
14	D4	
15	D3	
16	D2	
17	D1	
18	MT	This is the output terminal to eliminate shock noise due to unlocking at PLL. When the CE terminal is at low level, the output from this terminal is at high level. Power "ON" Power "OFF" 700μs 4V 0V Muting "ON" Muting "OFF"
19	X2	Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.
20	X1	
21	VDD	Power supply terminal of the device.
22	E01	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
23	GND	Ground terminal.
24	E02	Not used in this unit.
25	CE	This is the selected signal input terminal of the device. When operating the device, make the level high, and when it is not used, make the level low. When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D6) terminals are off, but the memory is held. Power "ON" Power "OFF" 4V 0V The device does not operate during this period.
26	SD	This input terminal detects the reception of a broadcasting station. The voltage is 4.2V during reception, and otherwise 0V.
27	FM	Input terminal for FM OSC output frequency-divided to 1/16 or 1/17 by pre-scaler.
28	PSC	This is the terminal to deliver the frequency dividing ratio changeover output signal to the pre-scaler. The terminal continues to produce pulses at the rise of the signal applied to FM terminal (27) until the content of the inside swallow counter is 0. When the swallow counter comes to 0, the terminal level becomes low, then the frequency dividing ratio of pre-scaler is 1/16. Pulse two times larger than the value that cannot be divided by VCO/16. 1/17 1/16 4.25V 0V 40μs
29	INT	This is the interrupt demand signal input terminal. The signal from the control input terminal is put into this terminal, demanding for interruption, then the flow of program will be unconditionally shifted to the address No. 1.
30	AM	Input terminal for AM OSC output. 3.3V 1.2V 1 MHz ~ 2 MHz
31	PC2	This is 2-bit input/output port, DP terminal (31) is the decimal indication output terminal for the digital display (32) is not used in this unit.
32	PC3	
33	PB0	This is 4-bit input/output port. PB2 terminal (35) is the FM/AM changeover output terminal, which is 5V in FM, and 0V in AM. PB3 terminal (36) is the FM/AM changeover terminal, which is 5V in AM, and 0V in FM. Other terminals are not used in this unit.
34	PB1	
35	PB2	
36	PB3	
37	PA0	This is 4-bit input/output port. (Not used in this unit)
38	PA1	
39	PA2	
40	PA3	
41	PD3	One-bit input/output port. (Not used in this unit.)
42	VDP	One-bit output port. Output signal is emitted to operate the analog frequency meter, and the output voltage varies according to the frequency.



[Fig. 21]

- **Fluorescent Display Tube (FL)**


pin NO
(JA) (JA) (Grid 7) (Grid 6) (Sb) (Sf) (Sa) (Grid 5) (Grid 4) (Grid 3) (f2) (a2) (Grid 2) (b2) (Grid 1) (memory)
8 29 7 11 10 12 5 15 18 22 32 33 25 24 30 9
Filament
1 35
stereo
AM MW
FM LW
memory
kHz
MHz
2 4 26 13 6 20 19 14 27 17 16 23 34 21 31 3 28
(stereo) (AM) (FM) (LW) (MW) (Sc) (Se) (Sd) (Sg) (DPI) (DP2) (e2) (d2) (g2) (c2) (KHz) (MHz)

■ DESCRIPTION OF SPEAKER IMPEDANCE DETECTION CIRCUIT

This circuit serves to detect the impedance of speaker connected to the speaker terminals and to change the secondary tap voltage of power transformer according to the speaker impedance. It consists of a voltage comparing circuit, reset circuit, detection signal generating circuit, and speaker select relay drive circuit.

1) Reset circuit and detection signal generating circuit

The reset switch of speaker select switch is short-circuited only when the switch is shifted, with the speaker select switch shifted, the reset switch is short-circuited, then Q804 of reset circuit turns ON. When Q804 turns ON, positive voltage as in Fig. 22-A is generated at the collector of Q804, causing Q801 to turn ON.

When Q801 turns ON, Q509 turns OFF, and so does RLY801.

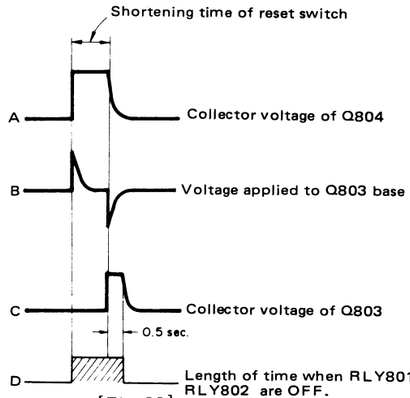
Also, when Q509 turns OFF, the collector potential of Q509 becomes positive, causing Q805 to turn OFF.

When the reset switch is open, a voltage as in Fig. 22-B is applied to the base of Q803 due to the charge and discharge of C803.

With Q803 turned ON, a voltage as in Fig. 22-C is generated at the collector of Q803. The voltage causes Q801 to turn ON.

When Q801 turns ON, RLY801 turns OFF and so does RLY802 (high volt tap). That is, both RLY801 and RLY802 are OFF during short-circuit of reset switch and for 0.5sec. more after opening the switch.

Also, when power switch is turned ON, C806 is charged with voltage, then the base voltage of Q804 becomes 0V and Q804 turns ON. Then both RLY801 and RLY802 turn OFF, and the speaker impedance detecting circuit operate. About 0.5sec. after power switch ON, C806 is discharged and Q804 turns OFF.



[Fig. 22]

2) Voltage comparing circuit

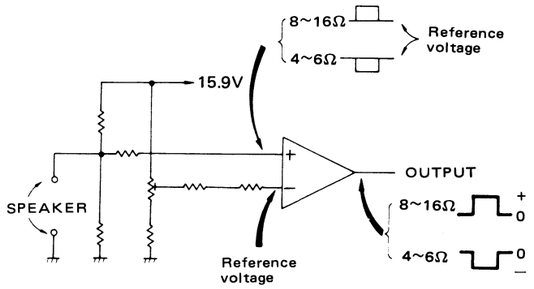
IC801 is a voltage comparing circuit. With RLY801 turned OFF, the speaker is connected to the voltage comparing circuit. (Fig. 23) The reference voltage is applied to minus terminals (② , ⑥) of IC801.

Also, plus terminals (③ , ⑤) of IC801 are subject to change according to the impedance of the speaker connected to the set.

The adjustment has been made with VR801 and VR802 so that the output voltage of IC801 is 0V with 6.5Ω speaker connected. If the impedance of the speaker connected is 4Ω, the output voltage of IC801 becomes negative, causing Q805 to turn ON.

Then RLY802 also turns ON (low volt tap).

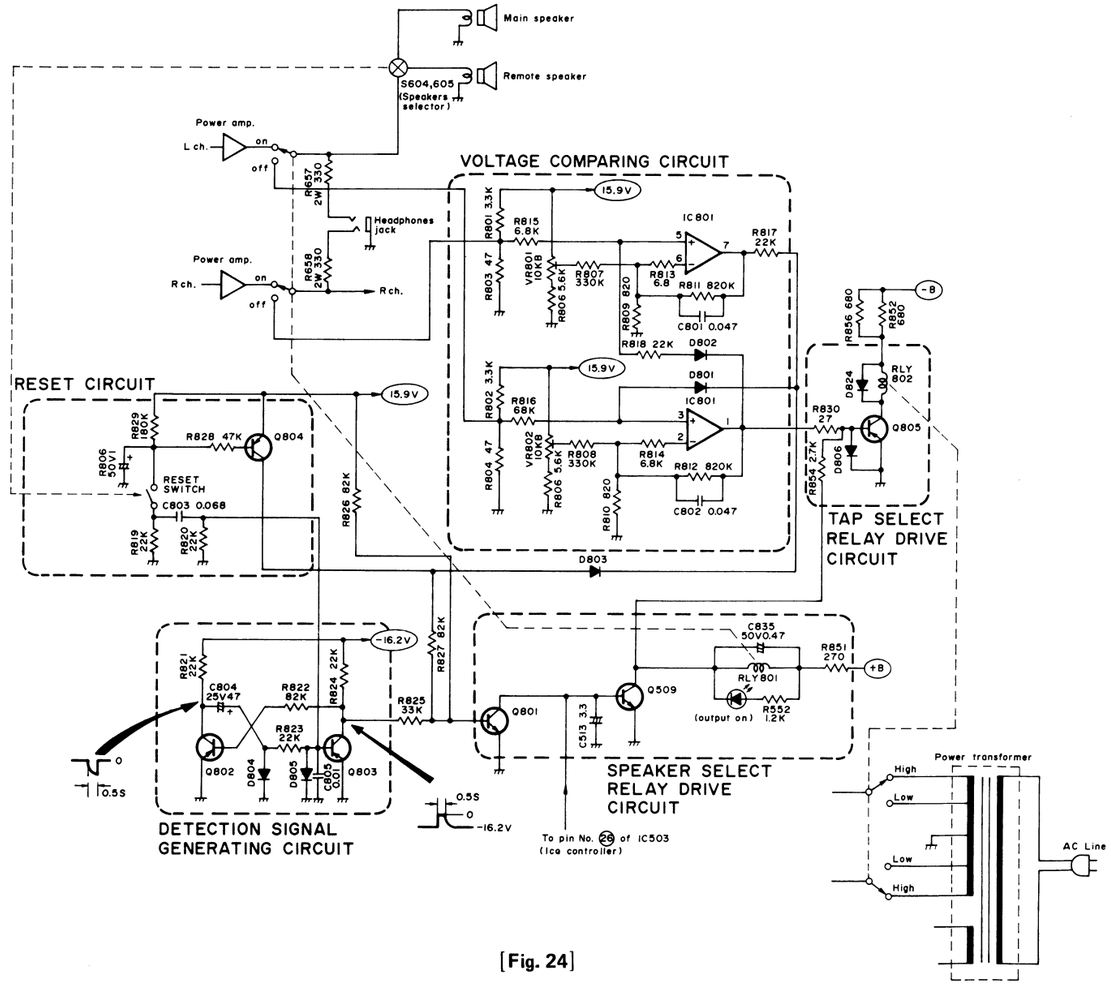
If the speaker impedance is 8Ω, the output voltage of IC801 becomes positive, then Q805 turns OFF and RLY802 also turns OFF (high volt tap).



[Fig. 23]

3) Voltage comparing circuit and reset circuit

The operation amplifier of voltage comparing circuit has a nature to hold the impedance 8Ω, or 4Ω once detected. So, if a speaker with different impedance is connected, it is necessary to turn OFF the power supply or shift the speaker select switch before operating the reset circuit.



[Fig. 24]

■ FUNCTION OF TERMINAL (VOLUME CONTROL IC404)

Pin No.	Mark	Name of block	Description of terminal
1	VDD	Power supply input terminal	Apply 5V
2	STEP	Test input terminal	Terminal for testing LSI
3	DISP OUT	Display output terminal	Volume level indicator drive output terminal
4	Vcc	Power supply input terminal	Apply 5V
5	VOL IN (1)	Volume input terminal (1)	L-channel volume input terminal
6	NC	Non-connection	Ground
7	VOL OUT (1)	Volume output terminal (1)	L-channel volume output terminal
8	Iout (1)	Current output terminal (1)	L-channel volume current output and feedback resistor connection terminal
9	GND (1)	Ground terminal (1)	L-channel ground terminal
10	GND (2)	Ground terminal (2)	R-channel ground terminal
11	Iout (2)	Current output terminal (2)	R-channel volume current output and feedback resistor connection terminal
12	VOL OUT (2)	Volume output terminal (2)	R-channel volume output terminal
13	NC	Non-connection	Ground
14	VOL IN (2)	Volume input terminal (2)	R-channel volume input terminal
15	Vss	Power supply input terminal	Ground (0V)
16	DOWN	Volume DOWN terminal	It serves to control volume DOWN. Volume down operation with "H" level input voltage applied.
17	UP	Volume UP terminal	It serves to control volume UP. Volume up operation with "H" level input voltage applied.
18	OSC	OSC input terminal	Clock signal (about 400 ~ 430 kHz) can be obtained by internal oscillation circuit.

■ FUNCTION OF TERMINAL (Ico CONTROLLER IC503)

Pin No.	Mark	Name of block	Description of terminal
1	Vss	Power supply input terminal	Grounded (0V)
2	CO_9	Output port C	It delivers Ico control signal through input port A (thermal sensor) and input port B (signal sensor). [Output "L"]
3	CO_8		
4	CO_7		
5	CO_6		
6	CO_5		
7	AI_3	Input port A	When DC detection circuit of power amplifier operates, the input level becomes "H".
8	AI_2		Not used in this unit.
9	AI_1		
10	AI_0		When 70°C (158°F) sensor of power amplifier operates, the input level becomes "L".
11	BI_3	Input port B	Input level changes to "L" as effective output 2V signal sensor of power amplifier operates. (L ch.)
12	BI_2		Input level changes to "L" as effective output 5V signal sensor of power amplifier operates. (L ch.)
13	BI_1		Input level changes to "L" as effective output 2V signal sensor of power amplifier operates (R ch.)
14	BI_0		Input level changes to "L" as effective output 5V signal sensor of power amplifier operates (R ch.)
15	EO_0	Output port E	Indicator "thermal" lights up at "L" output.
16	EO_1		Indicator "signal" lights up at "L" output.
17	EO_2		Indicator "auto" lights up at "L" output.
18	EO_3		Indicator "stand by" lights up at "L" output.
19	TST	Test input terminal	Terminal for testing LSI (Grounded)
20	RST	Reset input terminal	All outputs are cleared or reset with input at "L" (It is connected to power supply circuit)
21	SNS_0	Sensor input terminal	Conditional transfer (branch) is performed according to the input level.
22	SNS_1		Input level changes to "H" as power amplifier output short-circuit operates.
23	DO_0	Output port D	Indicator "preheat" lights up at "L" output
24	DO_1		Not used in this unit.
25	DO_2		
26	DO_3		Output relay turns ON with output at "H"
27	VDD	Power supply input terminal	Apply 5V.
28	OSC	OSC input terminal	Clock signal (about 400 kHz) can be obtained by internal oscillation circuit.

■ OPERATION OF Ico CONTROLLER

- **ON-time of each indicator, and output generated at pin terminal of microcomputer (IC503)**

▒ "ON" (light up) time

Output port	(4) pin CO_7	(2) pin CO_8	(3) pin CO_9	(15) pin EO_0	(16) pin EO_1	(17) pin EO_2	(18) pin EO_3	(26) pin DO_3	(23) pin DO_0
Ind. / sec.	bias thermal	bias high	bias low	sensor thermal	sensor signal	ICQ auto	output stand by	output on	ICQ preheat
Power "ON"	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Ⓛ
0.4 sec.	▒	▒	▒	▒	▒	▒	▒		▒
0.8 sec.	Ⓗ	Ⓗ	▒	▒	▒	Ⓗ	Ⓗ		▒
0.4 sec.			▒	▒	▒		Ⓛ		▒
0.4 sec.			▒	▒	▒		Ⓗ		▒
0.4 sec.			▒	▒	▒		Ⓛ		▒
0.4 sec.		Ⓛ	Ⓗ	▒	Ⓗ		Ⓗ		▒
0.4 sec.		▒	▒	▒			Ⓛ		▒
0.4 sec.		▒	▒	▒			Ⓗ		▒
0.4 sec.		▒	▒	Ⓗ	Ⓛ		Ⓛ		▒
0.4 sec.		▒	▒		▒		Ⓗ		▒
0.4 sec.		▒	▒		▒		Ⓛ		▒
0.4 sec.	Ⓛ	Ⓗ	▒		Ⓗ		Ⓗ		▒
0.4 sec.	▒		▒				Ⓛ		▒
0.4 sec.	▒		▒				Ⓗ		▒
14 sec.	Ⓗ		Ⓛ	Ⓛ	Ⓛ			Relay ON	▒
∫			Ⓗ	▒	▒	Ⓛ		Ⓗ	Ⓗ

Computer-drive monitor indicators

To prevent transient crossover distortion, a stabilized idling current (ICQ) through the power transistors is constantly necessary.
ICQ will vary with the signal level and the instantaneous temperature of the power transistors.
The microcomputer will optimize ICQ automatically by preheating the power transistors and sensing the signal level and the temperature of the power transistors.

* Transient crossover distortion is caused by momentary fluctuations of the ICQ level.

ICQ

When the power is turned on, the "preheat" indicator will illuminate. This shows that a high level of ICQ is flowing through the power transistors to achieve circuit stability quickly. When "auto" illuminates, the optimum ICQ level is flowing and being controlled by the microcomputer.

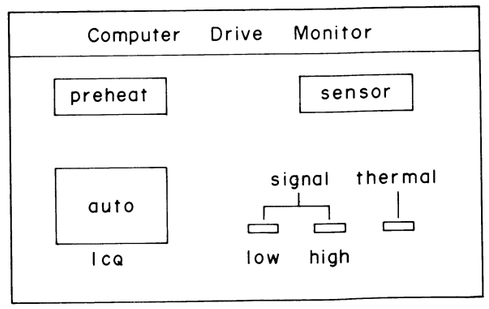
Sensor

- **Signal**

  When the signal level is very low, both the "low" and "high" indicators will illuminate. As the signal level is increased, the "low" indicator will go out. When the signal level is further increased, both indicators will be out.

- **thermal**

  When the "thermal" indicator illuminates, the temperature of the heatsink is low and no adjustment of ICQ is required by the microcomputer. When the "thermal" indicator goes off, the microcomputer is adjusting the ICQ because of the temperature rise of the heatsink,.



Output indicators (output)

These indicators show the condition of the signal sent to speakers or headphones.
When the power switch is switched on, the "stand by" indicator flashes, and, when the unit is operating normally, the "on" indicator will illuminate.

Note that the "stand by" indicator will flash if the positive and negative speaker terminals or speaker connection cords are short-circuited, or if some other circuit abnormality which causes the protection circuit to function os detected. If this occurs, switch the power switch off, and then on again after first determining the cause of the problem and correcting it.

1) Preheat

When power supply is turned ON, the level of IC503 pin ㉓ becomes low. At the same time, preheat LED (D530) lights up. Q510 turns ON, then voltage is applied to LED's (D533), (D536), (D537). Each of D533, D536 and D537 is controlled by IC503 terminals ② , ③ and ④ respectively. The output voltages are shown in Fig. 25. The "low" LED lights up first, followed by "high" LED, and then "thermal" LED. IC503 Pin ⑰ turns power supply ON as in Fig. 25. It becomes "H" 0.4 sec. later, then IC502 pin ⑤ (⑥) also becomes "H". IC502 pin ⑫ (⑪) changes to "L" and it is applied to Q617 (Q618), causing Q617 (Q618) to turn ON. IC502 pin ⑫ (⑪) delivers a large ICQ for 6 sec. after power ON (while pin ⑫ (⑪) is "L"), and after that, pin ⑫ (⑪) become 'H". ICQ is controlled by the output of IC503 pin ② , ③ , ④ .

2) Signal sensor and thermal sensor

The musical signal from power amplifier is applied to IC503 in ⑪ or ⑫ (pin ⑬ or ⑭) through D505 (D506) and IC501. When the signal changed to DC by D505 (D506) and C503 (C504), becomes about 2V, then "L" input is applied to IC503 pin ⑪ (pin ⑬), becomes about 5V, then "L" input is applied to IC503 pin ⑫ (pin ⑭), and the output is delivered to IC503 pin ② , ③ , ④ . Also, when the temperature of heat-sink becomes higher than 70°C the resistance of the thermistor (PS501) increases and IC501 pin ③ becomes "H". IC501 pin ⑭ changes to "L", then "L" input is applied to IC503 pin ⑩ . The output is delivered to IC503 pin ⑪ , ⑬ (pin ⑫ , ⑭) [signal sensor input] and IC503 pin ⑩(thermal sensor input), thereby controlling ICQ through R524, R527, R529 (R525, R526, R528) and Q617, Q618.

3) Power on/off muting

When power supply is turned ON, the output of IC503 pin ㉖ is "L" for about 6 sec. as in Fig. 25, then relay RLY801 turns OFF, and D528 output "on" LED also turns OFF. The voltage of IC503 pin ⑱ alternately becomes "L" and "H" for 6 sec. after power ON as in Fig. 25, causing D527 "stand by" LED to blink. IC503 pin ㉖ output becomes "H" 6 sec. after power ON, then relay RLY801 turns ON and D528 output "on" LED lights up.

When power supply is turned OFF, "H" is applied to IC502 pin ④ and IC502 pin ⑬ output changes to "L" because the time constant of C807 (1.5μF) and R832 (18kΩ) is smaller than that of C808 (12000μF) and R831 (82kΩ). The signal is put into IC503 pin ⑳ while "L" output is delivered to IC503 pin ㉖. When pin ㉖ becomes "L", Q509 turns OFF and so does relay RLY801.

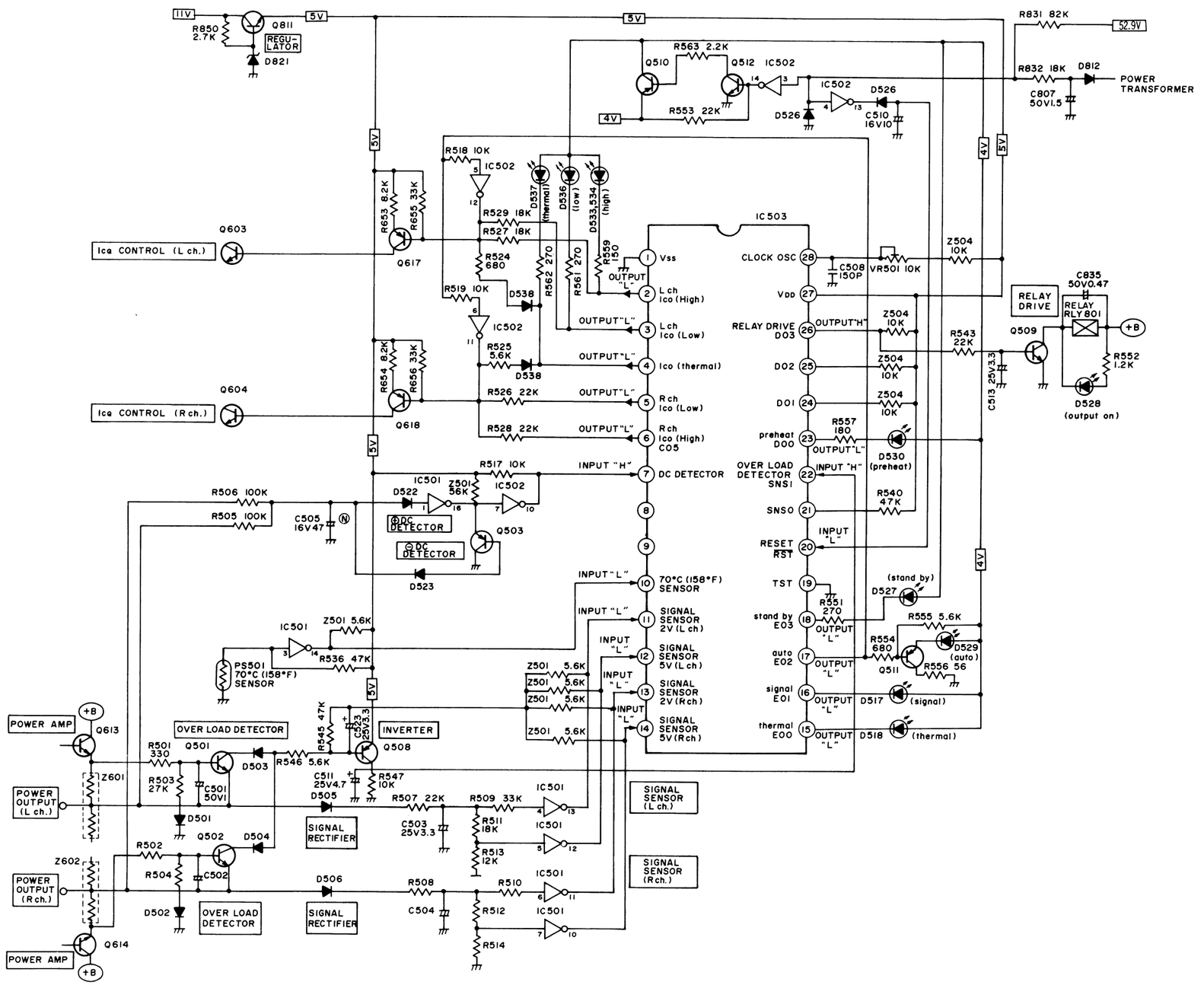
4) DC detection circuit

When the power amplifier voltage is over 2V DC. (IC501 pin ① (⊕ DC detection) and Q503 (⊖ DC detection) are turned ON, then "H" input is applied to IC503 pin ⑦ , and "L" output is delivered to IC503 pin ㉖ . When pin ㉖ becomes "L", relay RLY801 turns OFF the same as in power-off muting.

5) Overload detector circuit

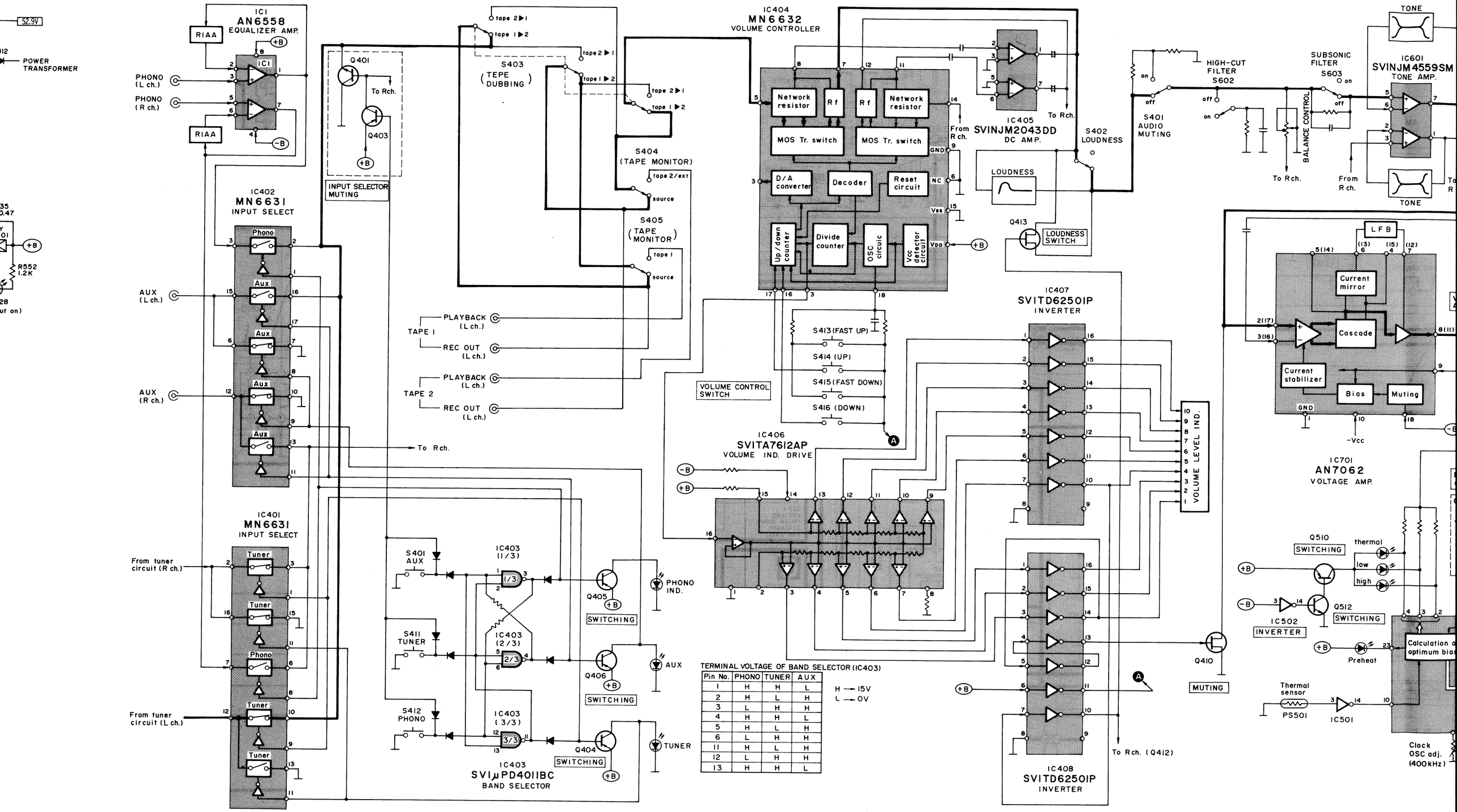
When speaker terminals are short-circuited, a large amount of current flows into Z601 (Z602), and the base of voltage of Q501 (Q502) increases, causing Q501 (Q502 and Q508 to turn ON. As Q508 turns ON, "H" input is applied to IC503 pin ㉒ , and "L" output is delivered to IC503 pin ㉖ . When pin ㉖ becomes "L", relay RLY801 turns OFF the same as in power off muting.

When "H" is applied to IC508 pin ㉒ , the output of IC503 pin ㉖ is held. Therefore, turn off the power switch and check the set beforehand. Otherwise, relay RLY801 will not turn ON.



■ BLOCK DIAGRAM

- **Input selector / Equalizer / Volume control / Ico control / DC detector / Overload detector / Tap selector / Pri · Drive · Power amp. / Power supply circuit.**



detector /

• Tuner block diagram, refer on page 26.

IC404
MN6632
VOLUME CONTROLLER

Network resistor
Rf
Rf
Network resistor
MOS Tr. switch
MOS Tr. switch
D/A converter
Decoder
Reset circuit
Up/down counter
Divide counter
OSC circuit
Vcc detector circuit
NC
GND
Vss
Vpp
+B

IC405
SVINJM2043DD
DC AMP.
From Rch.
To Rch.

LOUDNESS
Q413
LOUDNESS SWITCH
S402 LOUDNESS
S401 AUDIO MUTING
HIGH-CUT FILTER S602
SUBSONIC FILTER S603
BALANCE CONTROL
To Rch.
From Rch.

TONE
IC601
SVINJM4559SM
TONE AMP.
TONE
To Rch.

S404 (TAPE MONITOR)
tape 2▶1
tape 1▶2
tape 2/ext
source
S405 (TAPE MONITOR)
tape 1
source

VOLUME CONTROL SWITCH
S413 (FAST UP)
S414 (UP)
S415 (FAST DOWN)
S416 (DOWN)

IC406
SVITA7612AP
VOLUME IND. DRIVE

IC407
SVITD6250IP
INVERTER

VOLUME LEVEL IND.

PHONO IND.
AUX
TUNER

TERMINAL VOLTAGE OF BAND SELECTOR (IC403)

Pin No.	PHONO	TUNER	AUX
1	H	H	L
2	H	L	H
3	L	H	H
4	H	H	L
5	H	L	H
6	L	H	H
11	H	L	H
12	L	H	H
13	H	H	L

H → 15V
L → 0V

IC408
SVITD6250IP
INVERTER
To Rch. (Q412)
Q410
MUTING

LFB
Current mirror
Cascade
Current stabilizer
Bias
Muting
GND
-Vcc
VOLTAGE AMP
Q72

IC701
AN7062
VOLTAGE AMP.

Q601 Bias
Q605 Pre-drive
Q607 Pre-drive
Synchronous bias circuit
Q609 Driver
Q611 Driver
Q613 Power amp.
Q615 Power amp.
HEADPHONES
From Rch.
(MAIN) off on
(REMOTE) off on
MAIN (Lch.)
REMOTE (Lch.)

IC801
AN6552
VOLTAGE COMPARATOR
Reset switch
Reset circuit
Q804
Q805
Tap select relay drive
Relay 802
VR801 (Impedance det. adj.)
VR802 (Impedance det. adj.)
Q501 OVER LOAD DETECTOR
Q508 SWITCHING
Q617 Bias control
SIGNAL SENSOR
IC501
From Rch.
Q802, 803
Ditection signal generating circuit

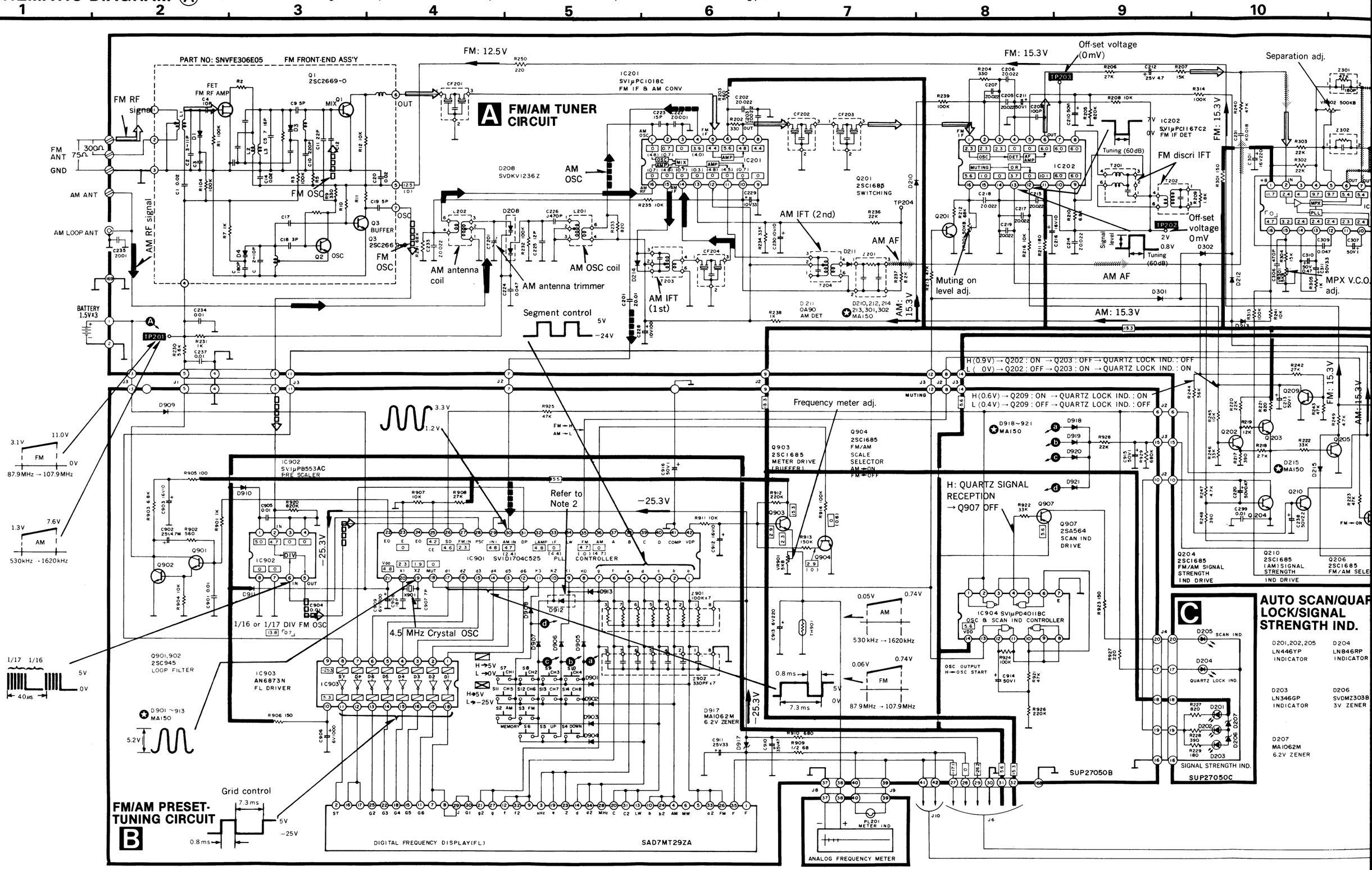
DC DETECTOR CIRCUIT
Q503
IC501 INVERTER
IC502 INVERTER
Q510 SWITCHING
thermal
low
high
Q512 SWITCHING
IC502 INVERTER
Preheat
Thermal sensor
PS501
IC501

Q801
Speaker select relay drive
Relay 801
OUTPUT ON
Q509 SWITCHING
Rectifier
Power transformer
high
low
low
high
AC Line

IC503
MN1421STA
ICQ CONTROL
Calculation of optimum bias
Protection circuit
Muting
OUTPUT H
Clock OSC adj. (400kHz)
Q511 SWITCHING
low
signal
auto
stand by
IC502
POWER ON-OFF DETECTOR

■ SCHEMATIC DIAGRAM Ⓐ

(This schematic diagram may be modified at any time with the development of new technology.)



10 11 12 13 14 15 16 17 18 19

C AUTO SCAN/QUARTZ LOCK/SIGNAL STRENGTH IND.

D201,202,205 LN446YP INDICATOR
D204 LN846RP INDICATOR
D203 LN346GP INDICATOR
D206 SVDMZ303B 3V ZENER
D207 MA1062M 6.2V ZENER

SUP27050C

D EQUALIZER CIRCUIT

SUP24313

IC1 AN6558F EQUALIZER AMP

IC401,402 MN6631 16dB STEP ATT

1		4	-16.0	7	0	10	0	13	0	16	0				
2	0	5	0	8		11		14	16.0	17					
3	0	6	0	9		12	0	15	0	18	16.0				

H: 15V, L: 0.9V

E INPUT SELECTOR/ VOLUME CONTROL CIRCUIT

F

SUP27070C

D415 LN0603GP3G NEW CLASS A IND.

NEW CLASS A IND.

G

SUP27070B

IC406 SVITA7612AP VOLUME IND DRIVE

IC407,408 SVITD6250IP INVERTER

IC403 SVI/μ PD4011BC NAND GATE

IC404 MN6632 VOLUME CONTROLLER

Q301,302 2SC1685 MUTING

Q303 2SA564 MUTING CONTROL

Q209 2SC1685 AM MUTING

Q202,203 2SC1685 QUARTZ LOCK IND DRIVE

Q205 2SC1685 FM MUTING

Q204 2SC1685 FM/AM SIGNAL STRENGTH IND DRIVE

Q210 2SC1685 (AM) SIGNAL STRENGTH IND DRIVE

Q206 2SC1685 FM/AM SELECTOR

Q304 2SC1685 TUNER SELECTOR

Q207,208 2SA564 FM/AM SELECTOR

SUP27050A

Q401,402 2SD1011 MUTING

Q403 2SA564ANC MUTING

Q404 2SA564ANC AUX IND. DRIVE

Q405 2SA564ANC TUNER IND. DRIVE

Q406 2SA564ANC PHONO IND. DRIVE

Q410,411 2SJ104 TONE AMP SWITCH

Q412,413 2SJ103 LOUDNESS SWITCH

D401~403 SVDMC921

D410 SVDMZ309A

D413,414 MA1030L 3V ZENER

D404~410 MA150

S403,404 GRAPHIC EQUALIZER

S405,406 TAPE MONITOR

S404 (Tape monitor)

S405 (Tape monitor)

S403 (Tape dubbing)

Separation adj.

MPX V.C.O. adj.

Off-set voltage 0mV

19kHz output

Tuner AF signal output

GRAPHIC EQUALIZER OUT

TUNER : H
PHONO : L
AUX : L

TUNER : L
PHONO : H
AUX : H

TUNER : L
PHONO : L
AUX : H

TUNER : H
PHONO : H
AUX : L

Lower than the "3" mark of the volume control → 15V
Higher than the "4" mark of the volume control → 0V

H: 15V
L: 0V

−16.3V

16.3V

FM: 15.3V

AM: 15.3V

14 15 16 17 18 19 20 21 22 23

NEW CLASS A IND.

SUP27070C

F

D415 LN0603GP3G NEW CLASS A IND.

G VOLUME LEVEL IND. CIRCUIT

VOLUME LEVEL IND.

D420 ~ 429 LN41YPHLMS

PL401 PL402 VOLUME IND.

SUP27070B

Q401,402 2SD1011 MUTING

Q403 2SA564ANC MUTING

Q402 Q401

-16.3V

S403,404 GRAPHIC EQUALIZER

S404 (Tape monitor)

S405 (Tape monitor)

S403 (Tape dubbing)

S405,406 TAPE MONITOR

D401~403 SVDMC921

TUNER : L
PHONO: L
AUX : H

TUNER : H
PHONO: H
AUX : L

L R L R L R L R

GRAPHIC EQUALIZER OUT

TAPE2 PLAYBACK

TAPE2 REC OUT

TAPE1 PLAYBACK

TAPE1 REC OUT

IC402

TUNER : H
PHONO: H
AUX : L

IC401,402
MN6631
16dB STEP ATT

1		4	-16.0	7	0	10	0	13	0	16	0
2	0	5	0	8		11		14	16.0	17	
3	0	6	0	9		12	0	15	0	18	16.0

H: 15V, L: 0.9V

IC403
SVIμ PD4011BC
NAND GATE

TUNER : L
PHONO: H
AUX : H

H: 15V
L: 0V

Q404 2SA564ANC AUX IND. DRIVE

Q405 2SA564ANC TUNER IND. DRIVE

Q406 2SA564ANC PHONO IND. DRIVE

D404 ~410 MA150

Q412,413 2SJ103 LOUDNESS SWITCH

Lower than the "3" mark of the volume control → 15V
Higher than the "4" mark of the volume control → 0V

INPUT SELECTOR

VOLUME S413 FAST(UP) S414 UP FAST(DOWN) S415 DOWN S416

AUX/CD/VIDEO S410 TUNER S411 PHONO S412

D432~438 LN846RP

AUX/CD/VIDEO IND. TUNER IND. PHONO IND.

IC406 SVITA7612AP VOLUME IND DRIVE

IC407,408 SVIT062501P INVERTER

IC408 IC406 IC407

D410 SVDMZ309A

Q410,411 2SJ104 TONE AMP SWITCH

D413,414 MA1030L 3V ZENER

Q408,409 2SA684NC REGULATOR (CURRENT)

IC404 MN6632 VOLUME CONTROLLER

VDD STEP DOUT VCC VIN NC VOUT IOUT GND

OSC UP DOWN VSS VIN NC VOUT IOUT GND

IC405 SVINJM2043DD DC AMP

S402 LOUDNESS

S401 AUDIO MUTING

-16.3V

SUP27070A

41 42

L TONE CONTROL/POWER AMP./ REGULATOR CIRCUIT

Q605,606 2SC2631R PRE DRIVE

Q601,602 2SC1685NC BIAS CONTROL | D615 MA1180 | Q613,614 2SC3182R POWER AMP | Q609,610 2SC2824 DRIVE | ✪ D823 MA150

Q603,604 2SC2631R Icq CONTROL | Q607,608 2SA1123R PRE DRIVE | Q615,616 2SA1265R POWER AMP | Q611,612 2SA1184 DRIVE | D603~606 20A90

VOLTAGE AMPLIFIER CIRCUIT

Q71,72 2SA1123 VOLTAGE AMP

IC71 AN7062 VOLTAGE AMP SUP26070D

D71,72 MA162A

IC601 SVINJ4559DSM FLAT AMP

D607~610 0A90 | D601,602 611~614 MA27WA

Icq adj. (Lch) | Icq adj. (Rch) | TP1 Icq adj. | TP2 Icq adj. | TP3 Icq adj. | TP4 Icq adj.

−16.3V | −55.2V | −53.0V

HEADPHONES JACK

SUP27035F

SUP27035C

S605 MAIN | S604 REMOTE

SPEAKER (MUTING) | SPEAKER (MUTING) RELAY

L ch MAIN R ch SPEAKERS | L ch REMOTE R ch

Temperature det. (70°C(158°F))

PS501

Q618 2SA992 Icq CONTROL

Treble | Bass

S601 FM MODE | S602 high filter | S603 subsonic

D501,502 MA162A | D503,504 MA162 | D505,506 MA162A | D523 MA27WA

Q501,502 2SC1845 | Q503 2SA564ANC

IC501 SVITD6250IP CONVERTER

D522 MA150 | D526 0A90

IC502 SVITD6250IP INVERTER

2.6V

L

Load impedance detection 0mV

✪ D824 MA150

Q801 2SC1845 SGNAL DETECTION | Q802,803,804 2SA564ANC SWITCHING

Q805 2SA992 TAP SELECT RELAY DRIVE

✪ D801~806 MA150

TAP SELECT RELAY

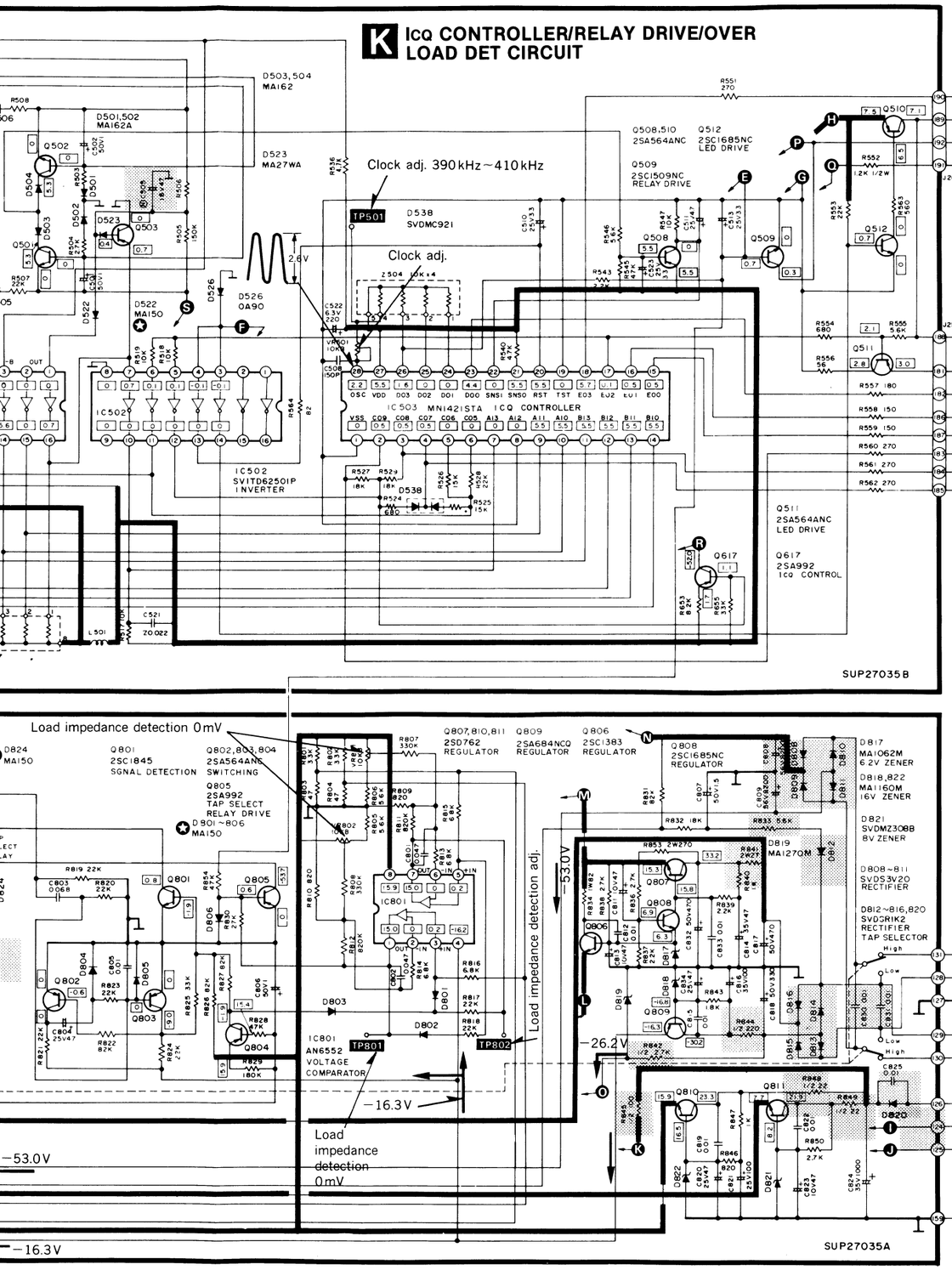
IC801 AN6552 VOLTAGE COMPARATOR

Load impedance detection 0mV

−53.0V

−16.3V

32 33 34 35 36 37 38 39



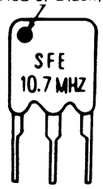
Note 2:

- **Use of ceramic filters in pairs**

The ceramic filters (CF201 ~ CF203) for FM-IF circuit are available in two ranks. For this machine, be sure to use the ceramics of the same rank in a pair.

At repairing and replacement, pay close attention to the diode (D912) for use as different diodes must be used depending on each rank of the ceramic filters.

Color marking (Red or Black)



RANK (Color)	D912	CENTER FREQUENCY
Black	O	10.65 MHz
Red	X	10.70 MHz

Note: O Mark Diode is used.
X Mark Diode is not used.

■ SCHEMATIC DIAGRAM Ⓑ

(This schematic diagram may be modified at any time with the development of new technology.)

Note 1:

1. **S2, 3** : Band selectors switch.
   S2 —— AM S3 —— FM
2. **S4, 5** : Tuning control switch
   S4 —— down (tuning to lower frequency)
   S5 —— up (tuning to high frequency)
3. **S6** : Memory switch.
   (manual ⟷ auto)
4. **S7 ~ S14** : Preset tuning switch.
   S 7 —— CH1 —— CH 9 S11 —— CH5 —— CH13
   S 8 —— CH2 —— CH10 S12 —— CH6 —— CH14
   S 9 —— CH3 —— CH11 S13 —— CH7 —— CH15
   S10 —— CH4 —— CH12 S14 —— CH8 —— CH16
5. **S401** : Audio muting switch in "**0 dB**" position.
   0dB ⟷ 20dB
6. **S402** : Loudness switch in "**off**" position.
   off ⟷ on
7. **S403** : Tape dubbing switch in "tape 1 ▶ 2" position. tape 1 ▶ 2 ⟷ tape 2 ▶ 1
8. **S404** : Tape monitor switch in "**source**" positon.
   source ⟷ tape 2/ext
9. **S405** : Tape monitor switch in "**source**" position.
   source ⟷ tape 1
10. **S410 ~ S412** : Input selectors switch.
    S410 —— phono
    S411 —— tuner
    S412 —— aux/CD/video
11. **S413 ~ S416** : Volume control switch.
    S413 —— fast up S415 —— fast down
    S414 —— up S416 —— down
12. **S601** : FM muting/mode switch in "**on/FM auto**" position.
    on/FM auto ⟷ off/FM mono
13. **S602** : High-cut filter switch in "**off**" position.
    off ⟷ on
14. **S603** : Subsonic filter switch in "**off**" position.
    off ⟷ on
15. **S604** : Remote speaker switch in "**off**" positon.
    off ⟷ on
16. **S605** : Main speaker switch in "**on**" position.
    off ⟷ on
17. **S1001** : Power switch in "**on**" position.
18. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
    * Figures in [ ] standard for DC voltage in FM signal (monaural signal) reception mode.
    * Figures in < > standard for DC voltage in AM signal reception mode.
    * Figure in ( ) stand for DC voltage in AM signal reception mode.

Positive voltage lines — AF signal lines
FM signal — FM OSC
AM signal — AM OSC

19. The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. with ✪ mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part please use the part No. in the replacement part list.

IMPORTANT SAFETY NOTICE

The shaded area on this schematic diagram incorporates special features important for protection from fire and electrical shock hazards.
When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

■ REPLACEMENT PARTS LIST

Notes:

1. Part numbers are indicated on most mechanical parts. Please use this part number for parts order.
2. Important safety notice:
   Components identified by ⚠ mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
4. The " Ⓢ " mark is service standard parts and may differ from production parts.
5. The parenthesized numbers in the column of description stand for the quality per set.

Areas

* [M] is available in U.S.A.
* [MC] is available in Canada.

Ref. No.		Part No.	Description
INTEGRATED CIRCUITS			
IC71		AN7062	Voltage Amp.
IC201		SVIUPC1018C	FM IF & AM Convertor
IC202		SVIUPC1167C2	FM IF Det.
IC301		SVIUPC1161C3	MPX
IC401,402		MN6631	Input Selector
IC403		SVIUPD4011BC	LED(Input) Controller
IC404		MN6632	Volume Controller
IC405		SVINJM2043DD	DC Amp.
IC406		SVITA7612AP	Volume Ind.Drive
IC407,408		SVITD62501P	Inverter
IC501,502		SVITD62501P	Inverter
IC503		MN1421STA	ICQ Controller
IC601		SVINJ4559DSM	Flat Amp.
IC801		AN6552F	Voltage Comparator
IC901		SVID1704C525	PLL Controller
IC902		SVIUPB553AC	Pre Scaler
IC903		AN6873N	FL Driver
IC904		SVIUPD4011BC	OSC Scan Ind. Controller
TRANSISTOR			
Q71,72		2SA1123-R	Voltage Amp.
Q201～206,209 210	Ⓢ	2SC1685-Q	Switching,Signal Strength Ind. Driver
Q207,208	Ⓢ	2SA722-S	FM/AM Selector
Q301,302	Ⓢ	2SC1685-Q	Muting
Q303	Ⓢ	2SA722-S	Muting Control
Q304	Ⓢ	2SC1685-Q	Tuner Muting
Q401,402		2SD1011-S	Muting
Q403～406	Ⓢ	2SA722-S	Muting
Q408,409	Ⓢ	2SA684-QNC	Regulator
Q410～413		2SJ103-GR	Tone Amp.Switch, Loudness Switch
Q501,502		2SC1845-E	Over Load Detector
Q503,508	Ⓢ	2SA722-S	DC Detector
Q509	Ⓢ	2SC1509FQ	Switching
Q510,511	Ⓢ	2SA722-S	Switching
Q512 601,602	Ⓢ	2SC1685-Q	LED,Drive,Bias Controller, Regulator
Q603～606		2SC2631-R	ICQ Controller, Pre Drive
Q607,608		2SA1123-R	Pre Drive
Q609,610		2SC2824-Y	Driver } Use Pair
Q611,612		2SA1184-Y	Driver } Ranks
Q613,614		2SC3182-R	Power } Use Pair
Q615,616		2SA1265-R	Power } Ranks
Q617,618		2SA992	ICQ Controller
Q801		2SC1845	Speaker Select Relay Drive
Q802～804	Ⓢ	2SA722-S	Detection Signal Generating Circuit
Q805		2SA992	Tap Relay Drive
Q806	Ⓢ	2SC1383Q	Regulator
Q807	Ⓢ	2SD762-Q	Regulator
Q808	Ⓢ	2SC1685-Q	Regulator
Q809	Ⓢ	2SA684-QNC	Regulator
Q810,811	Ⓢ	2SD762-Q	Regulator
Q901,902	Ⓢ	2SC945-Q	Loop Filter
Q903,904	Ⓢ	2SC1685-Q	FM/AM Scale Adj.
Q907	Ⓢ	2SA722-S	Scan Ind.Drive

Ref. No.		Part No.	Description
DIODES			
D71,72	Ⓢ	MA162A	Switching
D201,202,205,527		LN446YP	LED,Signal Strength(1,2) Scan,Output (Stand by)
D203,528		LN346GP	LED,Signal Strength(3) Output(on)
D204		LN846RP	LED,Quartz Lock
D206		SVDMZ303BM	3V,Zener
D207,817,917		MA1062M	6.2V,Zener
D208	Ⓢ	SVDKV1236Z	AM Variable Capacitor
D210,301,302	Ⓢ	MA162A	Switching
D211	Ⓢ	20A90	Detector,Bias
D212～215	Ⓢ	MA162A	Switching
D401～403		SVDMC921	Switching
D404～410	Ⓢ	MA162A	Switching
D413,414		MA1030L	3V,Zener
D415,529		LN0603QP3G	LED,New Class A,Computer Drive Monitor(auto)
D420～429		LN41YPHLMS	LED,Volume Level Ind.
D432～438		LN846RP	LED,Input Selector
D440		SVDMZ309A	9V,Zener
D501～506 522	Ⓢ	MA162A	Switching
D523		MA27W-A	Bias
D526	Ⓢ	20A90	Detector,Bias
D530		LN0202YP4	LED Preheat
D531～537		SVDAY5533K-M	LED Computer Drive Monitor
D538		SVDMC921	Switching
D601,602		MA27W-A	Bias
D603～610	Ⓢ	20A90	Detector,Bias
D611～614		MA27W-A	Bias
D615		MA1180M	18V,Zener
D801～806	Ⓢ	MA162A	Switching
D808～811	⚠ Ⓢ	SVDS3V40	Rectifier
D812～816 820	⚠ Ⓢ	SVDSR1K2	Rectifier
D818,822	Ⓢ	SVDRD16EB	16V,Zener
D819		MA1270M	27V,Zener
D821		SVDMZ308B	8V,Zener
D824	Ⓢ	MA162A	Switching
D901～913	Ⓢ	MA162A	Switching
D918～921	Ⓢ	MA162A	Switching
COILS			
L201		SL02C29R-P	AM OSC
L202		SLA2C5-P	AM Antenna
L501		SLQX101-3M	Choke
L601,602		SLQY15G-30	Choke
FUSE			
F1	⚠	XBA1F40NU14	Power Source, 125V,4A
RELAYS			
RLY801	⚠	SSY107-1	Speaker
RLY802		SSY109-1	Tap Select
TRANSFORMERS			
T1	⚠	SLT5N419	Power Source
T201		SLI4C541-Z	FM IFT
T202		SLI4C543-Z	FM IFT
T203		SLI2C127-M	AM IFT
T204		SLI2C413	AM IFT

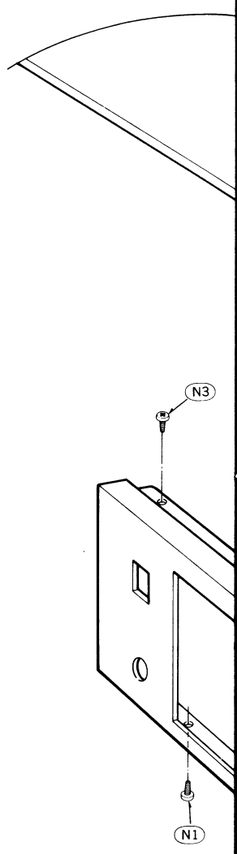
Ref. No.		Part No.	Description
VARIABLE RESISTORS			
VR201		EVN58AA00B54	Muting on Level Adj,50KΩ(B)
VR301		EVN75AA00B53	VCO,5KΩ(B)
VR302		EVN58AA00B55	Separation Adj,500KΩ(B)
VR501	Ⓢ	EVNM0AA00B14	Clock Frequency Adj,10KΩ(B)
VR601,602		EVNK6AA00B52	ICQ Adj,500Ω(B)
VR603		EVD00305G15S	Balance,100KΩ(G)
VR604,605		EWD00205C15S	Bass,Treble, 100KΩ(C)
VR801,802		EVNK6AA00B14	Tap Selector, 10KΩ(B)
VR901		EVN58AA00B53	Frequency Meter Adj,5KΩ(B)
VARIABLE CAPACITOR			
CT201		SVCTY121B269	Trimmer,AM Antenna
COMPONENT COMBINATIONS			
Z201		EXRF203Z471S	0.02μF,470Ω
Z301,302		EXRP181K473C	180pF,47KΩ
Z401,501		EXBP87562K	5.6KΩ(X7)
Z504		EXBP84103J	10KΩ(X4)
Z601,602		ERF3GBKR22N	3W,0.22Ω
Z901		EXBP87104M	100KΩ(X7)
Z902		EXFP7331MW	330pF(X7)
FLUORESCENT DISPLAY TUBE			
		SAD7MT29ZA	Digital Frequency Display
FM FRONT END			
		SNVFE306E05	
THERMISTORS			
PS501		SRPBG47101	Thermal Det.
TH601,602		RRT104	100KΩ
TH901		ERTD2ZHL103S	10KΩ
CERAMIC FILTERS			
CF201～203		SVFE107MM-A	FM,10.7MHz(Red)
		SVFE107MM-D	FM,10.65MHz (Black)
CF204		SVFSFP450HT	AM,450KHz
		(Use pair ranks as same as CF201,CF202 and CF203)	
SWITCHES			
S2～14,410～416		SSG13	Band Selector, Tuning Memory Preset Tuning, Input Volume Control
S401		SSH1101	Audio Muting
S402		SSH1031	Loudness
S403～405		SSH3055	Tapemonitor, Tape-dubbing
S601～603		SSH1031	High-cut Filter, Subsonic Filter, FM Muting/ FM Mode
S604,605		SSH2059	Speaker Selector
S1001	⚠	SSH1071	Power Source
CRYSTAL			
X901		SVQ49U452-T	4.5MHz
LAMPS			
PL401,402		XAMR68S8	Volume Control (8V,0.07A)

Ref. No.		Part No.	Description
CABINET and CHASSIS PARTS			
1		SGW4650PA	Front Panel (1)
2		SGU347SA	Transparent Plate (1)
3		SGXA510M	Front Sub Panel Ass'y (1)
3-1		SBC483-2	Button,Speaker (2)
3-2		SBC565-1M	Button,Selector (8)
3-3		SHR5247	Spacer,Selector (1)
3-4		SHR5255	Spacer,Selector (1)
3-5		SUS257	Spring (10)
3-6		SDU193SA	Dial Plate (1)
4		SDH553	Reflector Plate (1)
5		SFUMC10-23	Connection Rod,Volume (2)
6		SDU89-1	Filter FL (1)
7		SBC337-1M	Button,Power (1)
8		SBD69-2M	Button,Bass,Treble Balance (3)
9		SGX7515	Case,Bass Treble Balance (1)
10		SBZ663-1	Connection Rod,Bass Treble,Balance (3)
11		SHR9667	Spacer (8)
12		SHR415	Pin,P.C.B (2)
13		SKU10530	Bottom Board (1)
14		SUW2025	Bracket,P.C.B (1)
15		SKL249	Foot (4)
16		SML137	Holder (1)
17		SJJ71B	Jack,Headphone (1)
18		SJT345	Crip,Fuse (2)
19		SMX515	Insulation Sheet (1)
20(M)	⚠	SJS9221-1	Socket (2)
20(MC)	⚠	SJS9223	Socket (2)
21		SJF4815-2	Terminal,Speaker (1)

Ref. No.		Part No.	Description
22		SJF3247-2N	Terminal,AM Antenna (1)
23		SJF4419-4	Terminal,FM Antenna (1)
24		SJF3057N	Terminal Input (1)
25		SJF3055-5N	Terminal Input (1)
26(M)	⚠	RJA9Y	Cord,Power Source (1)
26(MC)	⚠	SJA109	Cord,Power Source (1)
27(M)		RHR111	Bushing,AC Cord (1)
27(MC)		SHR129	Bushing,AC Cord (1)
28		SJB3005-1	Case,Battery (1)
29		SJC7	Terminal Battery (2)
30		SJC9	Terminal Battery (2)
31(M)		SGP3730A	Rear Panel (1)
31(MC)		SGP3730-1A	Rear Panel (1)
32		SUW2057	Bracket,FL (2)
33		SKC1430S1	Cabinet (1)
34		SMX767	Insulation Sheet, Power Tr. (2)
35		SSM175-4	Meter (1)
36		SHR301	Cramper,Read Wire (2)
SCREWS			
N1	Ⓢ	XTB3+10BFN	Tapping,+3×10 (3)
N2	Ⓢ	XSN3+8S	+3×8 (2)
N3	Ⓢ	XTB3+8BFN	Tapping,+3×8 (2)
N4	Ⓢ	XSN3+6S	+3×6 (2)
N5	Ⓢ	XSN3+6S	+3×6 (2)
N6	Ⓢ	XSN3+6S	+3×6 (2)
N7	Ⓢ	XTB4+8BFN	Tapping,+4×8 (4)
N8	Ⓢ	XTB3+8BFN	Tapping,+3×8 (4)
N9	Ⓢ	XTB3+8BFN	Tapping,+3×8 (3)
N10	Ⓢ	XTB3+8BFN	Tapping,+3×8 (3)

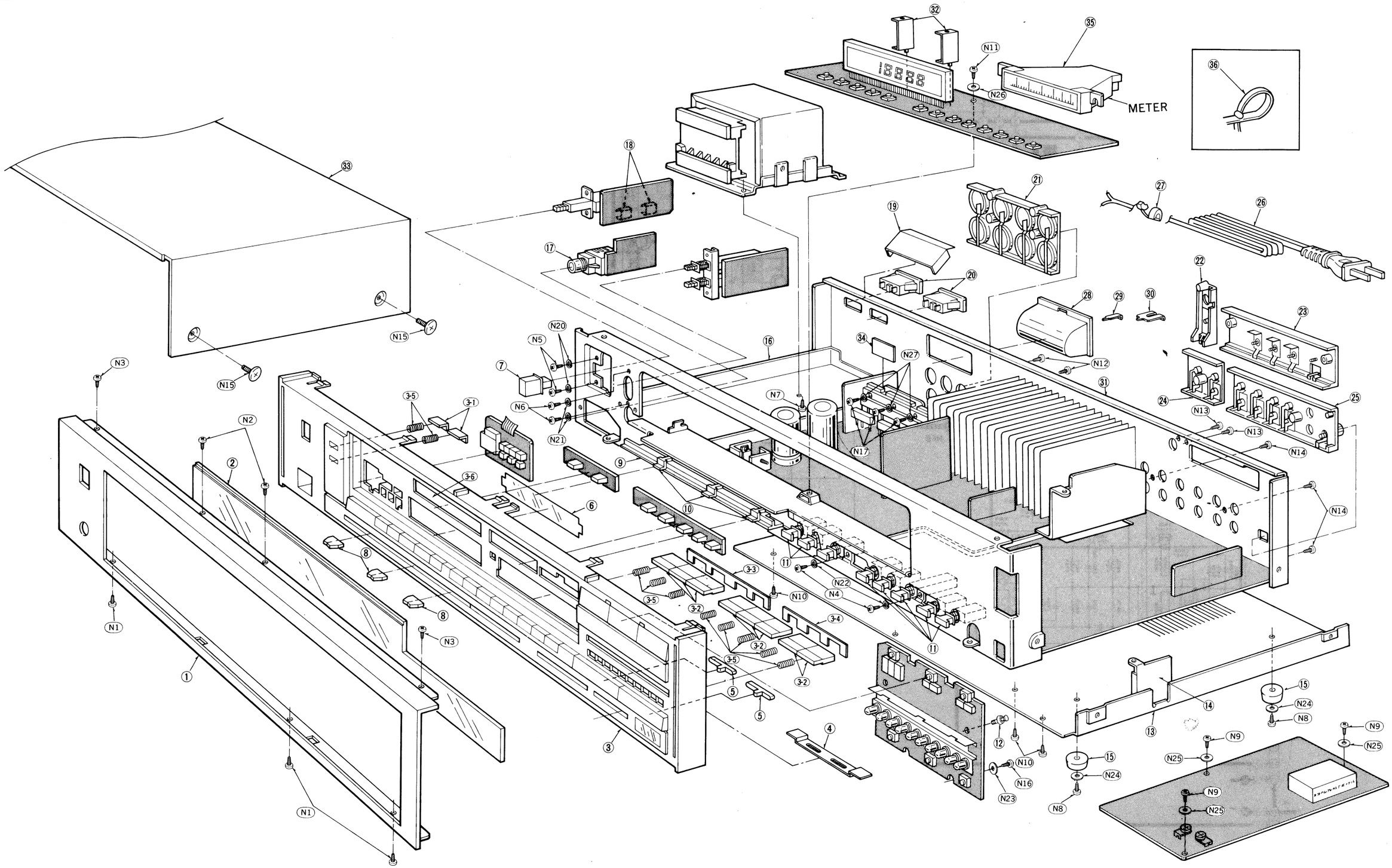
Ref. No.		Part No.	Description
N11	Ⓢ	XTB3+8BFN	Tapping,+3×8 (1)
N12	Ⓢ	XTB3+8BFZ	Tapping,+3×8 (4)
N13	Ⓢ	XTB3+8BFZ	Tapping,+3×8 (3)
N14	Ⓢ	XTB3+8BFZ	Tapping,+3×8 (3)
N15		SNE2095-2	Cabinet (4)
N16	Ⓢ	XTB3+8BFN	Tapping,+3×8 (2)
WASHERS			
N20	Ⓢ	XWA3B	Spring,φ3 (2)
N21	Ⓢ	XWA3B	Spring,φ3 (2)
N22	Ⓢ	XWA3B	Spring,φ3 (2)
N23	Ⓢ	XWG3	Plain,φ3 (2)
N24	Ⓢ	XWG3	Plain,φ3 (4)
N25	Ⓢ	XWG3	Plain,φ3 (3)
N26	Ⓢ	XWG3	Plain,φ3 (1)
N27	Ⓢ	XWA3B	Spring,φ3 (3)
ACCESSORIES			
A1		SSA611-1	Loop Antenna(AM) (1)
A2		SMA231	Holder (1)
A3		SMA233-1	Holder (1)
A4		XTN3+10AFZ	Screw (2)
A5		SSA267-1	Cord, Antenna(FM) (1)
A6(M)		SQF11677-2	Instruction Book (1)
A6(MC)		SQF11679	Insutruction Book (1)
PACKING PARTS			
P1(M)		SPG4389	Carton Box (1)
P1(MC)		SPG4381	Carton Box (1)
P2		SPS3015-3	Pad,Left (1)
P3		SPS3017-2	Pad,Right (1)
P4		SPS4059	Pad,Upper (1)
P5		SPP723	Polythylene Bag (1)

■ EXPLODED V



■ EXPLODED VIEWS

	Description	
	pping, +3×8	(1)
	pping, +3×8	(4)
	pping, +3×8	(3)
	pping, +3×8	(3)
	binet	(4)
	pping, +3×8	(2)
	ring, φ3	(2)
	ring, φ3	(2)
	ring, φ3	(2)
	ain, φ3	(2)
	ain, φ3	(4)
	ain, φ3	(3)
	ain, φ3	(1)
	ring, φ3	(3)
	op Antenna(AM)	(1)
	lder	(1)
	lder	(1)
	rew	(2)
	rd, Antenna(FM)	(1)
	truction Book	(1)
	utruction Book	(1)
	rton Box	(1)
	rton Box	(1)
	d,Left	(1)
	d,Right	(1)
	d,Upper	(1)
	lythylene Bag	(1)



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